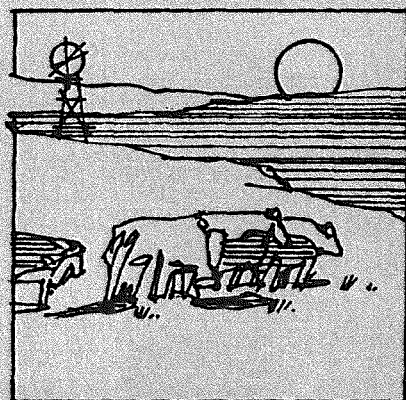


1986 AGRICULTURAL RESEARCH



Report of
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Agricultural
Experiment
Station

Kansas
State
University,
Manhattan

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Director

SOUTHEAST KANSAS BRANCH STATION

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Contribution No. 86-387-S from the Kansas Agricultural Experiment Station.



Effect of Salinomycin¹ on Performance of Grazing Stocker Heifers

Lyle W. Lomas

Summary

The effect of feeding 0, 25, 50, 100, or 150 mg of salinomycin per head daily on performance of stocker heifers grazing smooth bromegrass pasture was evaluated in a 126-day trial. Feeding 100 or 150 mg of salinomycin per head daily produced the highest weight gain in this study.

Introduction

Salinomycin, an experimental feed additive, is a polyether ionophore that alters rumen microbial population and fermentation patterns. Salinomycin has been shown to be effective in improving performance of finishing cattle, but limited data are available evaluating the effect of feeding this compound to grazing stocker cattle.

Experimental Procedure

Eighty Charolais crossbred yearling heifers were used to evaluate the effect of feeding salinomycin on performance of grazing stocker cattle. Five treatments provided daily salinomycin intakes of 0, 25, 50, 100, or 150 mg per head to grazing stocker heifers in 2 lb of ground corn that was hand-fed once daily. The five treatments were replicated twice, utilizing 10 10-acre smooth bromegrass pastures with eight heifers per pasture. The study began on April 17, 1985 and terminated on August 21, 1985 (126 days). Initial and final heifer weights were each the average of two nonshrunk weights taken on consecutive days. Treatment groups were rotated among pasture plots at 14-day intervals in an attempt to minimize effects of differences in forage availability and/or quality among treatment groups.

Results

A summary of grazing heifer performance is listed by salinomycin treatment in Table 1. Heifers that received 100 or 150 mg of salinomycin per head daily had the highest average daily gains and gained significantly more weight ($P < .01$) than those fed 25 mg of salinomycin per head daily. There were no significant differences ($P > .05$) in rate of gain between any of the other salinomycin levels.

¹Salinomycin is an experimental feed additive produced by the A. H. Robins Co., Richmond, VA, which provided the feed additive and partial financial assistance to conduct this study.

Table 1. Effect of Salinomycin on Performance of Grazing Heifers (126 days).

Item	Salinomycin Level (mg/hd/day)				
	0	25	50	100	150
Initial wt., lb	574	573	575	573	574
Final wt., lb	753	731	751	766	762
Total gain, lb	179 ^{a, b}	158 ^a	176 ^{a, b}	193 ^b	188 ^b
Average daily gain, lb	1.42 ^{a, b}	1.25 ^a	1.40 ^{a, b}	1.53 ^b	1.49 ^b

a, b Means with different superscripts differ significantly (P<.01).



Effect of Adding Wheat to Creep Feed on Performance of Suckling Calves

Lyle W. Lomas

Summary

Daily gains and creep feed consumption of fall-dropped calves creep fed a mixture of 2/3 oats and 1/3 hard red winter wheat or a mixture of 2/3 oats and 1/3 corn were compared in this study. Calves fed oats + wheat consumed 25% less creep feed than those fed oats + corn, but gains were similar ($P > .15$). Based on this study, wheat appears to be a viable substitute for corn in creep rations.

Introduction

Creep feeding usually increases weaning weights of beef calves by 40 to 80 lb. Greatest response to creep feeding is obtained with fall calves or calves born to cows that are poor milkers, and when pasture conditions are poor. Cost of creep feed, feeder-calf prices, and age when calves are to be marketed determine the profitability of creep feeding. Corn and milo have traditionally been used in creep rations. However, under current market conditions, wheat may be an economical alternative. The performance of fall-dropped calves creep fed a mixture of 2/3 oats and 1/3 hard red winter wheat or 2/3 oats and 1/3 corn was compared in this study.

Experimental Procedure

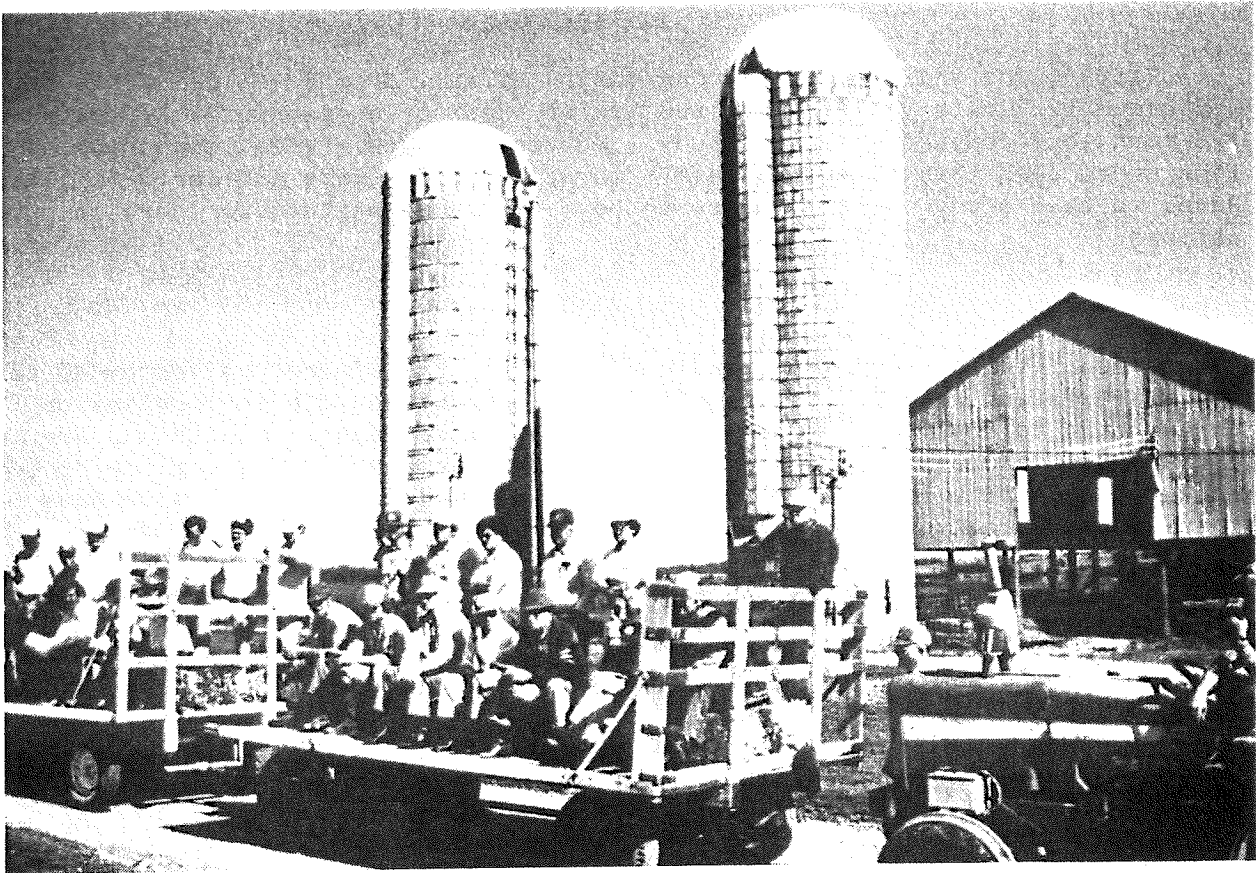
Twenty fall-dropped Simmental and Simmental x Angus calves (6 steers and 14 heifers) were allotted equally by weight, sex, and breed to two groups on November 27, 1984 and all steer calves were implanted with Ralgro^(R). One group was creep fed a mixture of 2/3 oats and 1/3 hard red winter wheat, while the other group was creep fed a mixture of 2/3 oats and 1/3 corn. Each group of calves and their respective dams were wintered on 15-acre fescue pastures and were fed big round bales of mixed grass hay ad libitum. One calf was removed from the oats + wheat group for reasons unrelated to experimental treatment. Calves were weaned on May 15, 1985, when they were approximately 7 months old.

Results

Results of this study are presented in Table 2. Average daily gains of calves creep fed oats + wheat and oats + corn were 2.18 and 2.33 lb per head daily, respectively. These gains were not significantly different ($P > .15$). Average daily consumption of oats + wheat and oats + corn was 3.3 and 4.4 lb per head daily, respectively.

Table 2. Oats + Wheat vs. Oats + Corn as Creep Ration (168 days).

Item	Oats + Wheat	Oats + Corn
No. of calves	9	10
Initial wt., lb	195	196
Final wt., lb	562	587
Total gain,	367	391
Average daily gain, lb	2.18	2.33
Average daily creep feed intake, lb	3.3	4.4





Fescue vs Fescue-Ladino Clover Pasture and Wheat vs Milo as Energy Supplement
for Wintering Stocker Steers

Lyle W. Lomas and Joseph L. Moyer

Summary

Hard red winter wheat and milo were compared as energy supplements for stocker steers grazing fescue or fescue-ladino clover pasture during the winter months. There was no significant difference ($P > .20$) in gain between steers fed wheat and those fed milo. Therefore, it appears that wheat can be successfully used as an energy supplement for grazing stocker cattle. Steers wintered on fescue pasture gained 20.3% more weight ($P < .01$) and consumed 26.9% less hay ($P < .05$) than those wintered on fescue pasture interseeded with ladino clover.

Introduction

Interseeding legumes into established stands of cool-season grasses is a management practice that has gained a lot of attention in recent years for several reasons. Legumes fix nitrogen into the soil, thereby reducing nitrogen fertilizer requirements. Cool-season grass pastures interseeded with legumes also produce higher gains by grazing beef cattle during the summer months. Legumes interseeded in tall fescue pastures reduce the toxicity effects caused by the endophyte Epichloe typhina and extend the length of the grazing season further into the summer months.

Supplementation with energy is an effective way of increasing gains of grazing stocker cattle. Energy supplementation also serves as a carrier for monensin or lasalocid and other feed additives that might be beneficial. Hand-feeding energy supplement gives the cattleman an opportunity to check his cattle and observe them for possible health problems. Milo is the most common energy supplement fed to stocker cattle in southeastern Kansas. However, wheat is grown on most farms and is also available as a feedstuff. The following study was conducted to compare performance of stocker cattle grazing fescue in a pure stand or fescue interseeded with ladino clover and to compare milo and hard red winter wheat as energy supplements for wintering grazing stocker cattle.

Experimental Procedure

On November 17, 1984, 72 steer calves (485 lb) were implanted with Ralgro^(R) and randomly allotted to eight 5-acre Kentucky 31 fescue pastures with nine head per pasture. These pastures had an Epichloe typhina infestation level of approximately 65%. Four of these pastures had been broadcast with 5 lb of Regal ladino clover seed per acre on February 14, 1984, whereas the other four pastures contained fescue only. All pastures

were fertilized with 30-52-102 lb of N-P₂O₅-K₂O per acre in September, 1984 and pastures with fescue only were fertilized with 85 lb of N per acre in December, 1984.

Cattle on two of the pastures interseeded with ladino clover and two of the pastures that contained fescue only were fed 4 lb of dry rolled milo per head daily, whereas steers on the other four pastures were fed 4 lb of coarsely ground hard red winter wheat per head daily. All steers were also hand-fed 1 lb of soybean meal per head daily containing 150 mg of monensin, which was mixed with the milo and wheat. All cattle were fed mixed grass hay ad libitum from big round bales. The study was terminated on March 27, 1985. Initial and final weights were taken following a 16-hour shrink from both feed and water.

Results

Performance of cattle grazing fescue pasture interseeded with ladino clover is compared with that of steers grazing pastures containing fescue only in Table 3. Steers wintered on fescue only gained 20.3% more weight (20 lb) (P<.01) and consumed 26.9% less hay (P<.05) than those wintered on fescue pasture interseeded with ladino clover. Fescue pastures produced 18.0% more gain per acre (P<.01) (34 lb) during the winter months than fescue pastures interseeded with ladino clover. The difference in hay consumption was primarily due to more grass being available for grazing in pastures that contained fescue only as a result of nitrogen fertilization. Therefore, cattle harvested more forage by grazing and consumed less hay than steers on pastures that were interseeded with ladino clover.

Performance is listed by source of energy supplement in Table 4. There was no significant difference (P>.20) in gain between steers fed milo and those fed wheat.

Table 3. Fescue vs Fescue-Ladino Clover Pasture for Wintering Stocker Cattle (140 days).

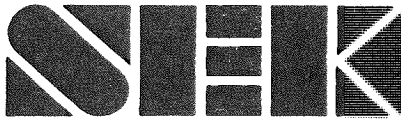
Item	Fescue	Fescue-Ladino Clover
No. of steers	36	36
Initial wt., lb	486	485
Final wt., lb	610	590
Total gain, lb	124	105
Average daily gain, lb	.89 ^a	.74 ^b
Stocking rate, steers/acre	1.8	1.8
Liveweight gain, lb/acre	223 ^a	189 ^b
Daily hay consumption, lb	9.3 ^c	11.8 ^d

a, b Means with different superscripts differ significantly (P<.01).

c, d Means with different superscripts differ significantly (P<.05).

Table 4. Wheat vs Milo as Energy Supplement for Wintering Grazing Stocker Cattle (140 days).

Item	Wheat	Milo
No. of steers	36	36
Initial wt., lb	485	486
Final wt., lb	597	603
Total gain, lb	112	117
Average daily gain, lb	.80	.84



Determination of Lasalocid Intake by Grazing Stocker Cattle from a Self-Fed
Supplement¹

Lyle W. Lomas

Summary

Thirty yearling steers were equally divided into three groups and grazed on fescue pasture for 98 days to determine voluntary intake of a commercial mineral mixture containing 1600 g of lasalocid per ton. Steers consumed an average of 3.85 oz of the medicated mineral mixture per head daily, which resulted in an average daily lasalocid intake of 192.5 mg per head.

Introduction

Bovatec^(R) is the trade name for lasalocid, which is an approved drug for use in beef feedlot cattle to improve feed efficiency and increase the rate of weight gain. It is also approved for use in pasture cattle when hand-fed at 60-200 mg/head/day in not less than 1 lb of grain/protein carrier. The use of Bovatec^(R) in self-fed supplements on pasture is currently not approved by the Food and Drug Administration.

Experimental Procedure

Thirty yearling steers (785 lb) were randomly allotted by weight to three replicates of 10 head each on June 11, 1985 and grazed on Kentucky 31 fescue pasture for 98 days to determine voluntary intake of a commercial mineral mixture containing 1600 g of lasalocid per ton. This mineral mixture contained 12% calcium, 12% phosphorous, and 12% salt. Loose mineral was fed in covered weathervane type mineral feeders and cattle had free access to unmedicated mineral for 21 days prior to the start of the study. During the study, mineral consumption was determined weekly by weighing the unconsumed mineral and subtracting this amount from the quantity placed in the feeder a week earlier. Cattle were rotated among pastures at 14-day intervals to minimize effects of differences in forage availability and/or quality among pastures. This study was terminated on September 17, 1985.

Results

Average daily intake of the mineral mixture that contained 1600 g of lasalocid per ton is listed by replicate in Table 5 for each 7-day period. Average daily intake of the mineral mixture was 3.85 oz per head for the entire 98-day period, which resulted in an average daily lasalocid intake of

¹Medicated mineral mixture and partial financial assistance for this study were provided by Farmland Industries, Inc., Kansas City, MO.

192.5 mg per head. There were 10 steers in replicate B from June 11 until July 2, then 9 steers from July 2 until September 17. A steer was removed from replicate B for reasons unrelated to the experimental treatment.

Table 5. Average Daily Intake of a Mineral Mix Containing 1600 g of Lasalocid Per Ton (oz/head/day)

Date	Replicate			Average
	A	B	C	
6-11 to 6-18	3.54	7.66	4.69	5.30
6-18 to 6-25	4.57	4.23	6.51	5.10
6-25 to 7-2	4.57	1.65	6.40	4.21
7-2 to 7-9	3.66	1.27	7.31	4.08
7-9 to 7-16	3.20	2.92	2.29	2.80
7-16 to 7-23	4.91	3.56	5.83	4.77
7-23 to 7-30	.80	2.54	6.40	3.25
7-30 to 8-6	2.97	2.54	6.40	3.97
8-6 to 8-13	.69	1.78	2.06	1.51
8-13 to 8-20	5.71	3.56	5.94	5.07
8-20 to 8-27	4.11	1.27	5.26	3.55
8-27 to 9-3	4.11	4.83	3.54	4.16
9-3 to 9-10	2.06	2.03	1.60	1.90
9-10 to 9-17	3.89	4.06	4.80	4.25
Average	3.48	3.14	4.93	3.85



Effect of Energy Supplementation on Subsequent Feedlot Performance of Steers

Grazing Bermudagrass

Lyle W. Lomas

Summary

Stocker cattle that had been supplemented with 0, 2, or 4 lb of energy supplement per head daily while grazing bermudagrass pasture were placed in the feedlot and finished for slaughter in order to determine the effect of such supplementation on subsequent feedlot performance. Steers that received no supplemental energy during the grazing phase gained faster and more efficiently in the feedlot than those that received supplemental energy while on pasture. Overall performance from the beginning of the grazing phase to the end of the finishing phase favored feeding no supplemental energy during the grazing phase. Overall performance was similar between steers that received 2 and 4 lb of supplemental energy per head daily while grazing bermudagrass.

Introduction

Energy supplementation is an effective way of improving gains of stocker cattle. However, if a producer retains ownership of his cattle to slaughter, the profitability of this practice needs to be further evaluated. This study evaluates subsequent feedlot performance of steers that received various levels of energy supplement while grazing bermudagrass.

Experimental Procedure

Forty-five yearling mixed crossbred steers with an initial weight of 704 lb were randomly allotted by weight and divided into three equal groups of 15 head each on June 15, 1984 and placed on three 5-acre Midland bermudagrass pastures and grazed until September 19, 1984 (96 days). One group received no energy supplementation, while the other two groups received 2 or 4 lb of rolled milo plus 150 mg of Rumensin^(R) per head daily. During the grazing phase, one steer was removed from the group that received no energy supplement for reasons unrelated to the experimental treatment. Following the grazing phase, all steers were placed in the feedlot and finished for slaughter. During the finishing phase, all cattle were started on 60% corn silage, 30% dry whole shelled corn, and 10% supplement. The level of silage was decreased and the level of corn increased 5% daily until the final ration of 15% corn silage, 75% dry whole shelled^(R) corn, and 10%^(R) supplement on a 100% dry matter basis was reached. Rumensin^(R) and Tylan^(R) were fed at 30 grams and 10 grams per ton of dry matter, respectively. Cattle were fed ad libitum once daily in fenceline bunks in dirt lots with no cover or wind protection. All steers were implanted at the beginning of the finishing period with Ralgro^(R). Initial and final weights were taken following a 16-

hour shrink from feed and water. Cattle were fed for 133 days and then slaughtered and carcass data were collected for each steer.

Results

Results of the 96-day grazing phase are listed in Table 6. During this phase, steers that received 2 lb and 4 lb of rolled milo per head daily gained 4.27 times more (60 lb) ($P < .01$) and 6.07 times more (87 lb) ($P < .01$), respectively, than the unsupplemented control group. Feeding 4 lb of rolled milo produced 34.2% more gain (27 lb) ($P < .05$) than feeding 2 lb per head daily. Because of an extremely dry summer, gains from all treatments were lower than anticipated.

Results of the finishing phase are listed in Table 7. During the finishing phase, steers that had received no energy supplement during the grazing phase gained 29.2% more (97 lb) ($P < .01$) and 41.7% more (127 lb) ($P < .01$) than those that received 2 lb and 4 lb of energy supplement per head daily, respectively, while grazing bermudagrass. Steers that received 2 lb of rolled milo per head daily during the grazing phase gained 9.6% more (30 lb) ($P < .10$) than steers that received 4 lb of energy supplement per head daily while on pasture. Feed conversion also favored cattle that were previously unsupplemented with grain during the grazing phase. Cattle that received no energy supplementation while grazing bermudagrass produced heavier carcasses with smaller ribeye areas, more external fat, a higher quality grade, and a higher numerical yield grade than steers that received energy supplementation while on pasture.

Overall performance from beginning of grazing phase through the end of finishing period is listed in Table 8. Overall performance favored feeding no energy supplement during the grazing phase. Steers that received no energy supplement during the grazing phase gained 9.0% more (37 lb) ($P < .10$) and 9.6% more (40 lb) ($P < .05$) than steers that received 2 lb and 4 lb of energy supplement per head daily while on pasture, respectively. Overall performance was similar between steers that received 2 lb and 4 lb of energy supplement per head daily while grazing bermudagrass.

These results are in conflict with results obtained from a similar study conducted in 1983-84, in which steers grazing bermudagrass were fed 0, 2, or 4 lb of rolled milo per head daily and then finished for slaughter. Steers that received 4 lb of rolled milo per head daily while grazing bermudagrass had the highest gains while grazing bermudagrass as well as in the feedlot. This study was continued in 1985, and the results will be reported in a future publication.

Table 6. Energy Supplementation of Steers Grazing Bermuda grass (96 days).

Item	Level of Milo (lb/head/day)		
	0	2	4
No. of steers	14	15	15
Initial wt., lb	703	705	705
Final wt., lb	718	780	807
Total gain, lb	15 ^c	75 ^{a, d}	102 ^{b, d}
Average daily gain, lb	.15 ^c	.79 ^{a, d}	1.06 ^{b, d}

a, b Means with different superscripts differ significantly (P<.05).

c, d Means with different superscripts differ significantly (P<.01).

Table 7. Effect of Backgrounding Energy Supplementation on Finishing Steer Performance (133 days).

Item	Level of Backgrounding Energy Supplement (lb/head/day)		
	0	2	4
No. of steers	14	15	15
Initial wt., lb	718	780	807
Final wt., lb	1148	1113	1110
Total gain, lb	430 ^a	333 ^{b, g}	303 ^{b, h}
Average daily gain, lb	3.23 ^a	2.50 ^{b, g}	2.28 ^{b, h}
Daily dry matter intake, lb	22.44	20.64	22.11
Dry matter intake/gain	6.95 ^g	8.26	9.70 ^h
Hot carcass wt., lb	687 ^g	666	663 ^h
Ribeye area, in ²	11.8 ^g	12.3 ^h	12.6 ^h
Fat thickness, in	.39 ^d	.35	.30 ^e
Quality grade	Ch	Ch-	Ch-
Yield grade	2.9 ^{a, d}	2.5 ^e	2.1 ^{b, f}

a, b, c Means with different superscripts differ significantly (P<.01).

d, e, f Means with different superscripts differ significantly (P<.05).

g, h, i Means with different superscripts differ significantly (P<.10).

Table 8. Effect of Backgrounding Energy Supplementation on Overall Steer Performance (229 days).

Item	Level of Backgrounding Energy Supplement (lb/head/day)		
	0	2	4
No. of steers	14	15	15
Initial wt., lb	703	705	705
Final wt., lb	1148 ^{a, c}	1113 ^d	1110 ^b
Total gain, lb	445 ^{a, c}	408 ^d	405 ^b
Average daily gain, lb	1.94 ^{a, c}	1.78 ^d	1.77 ^b

^{a, b} Means with different superscripts differ significantly (P<.05).

^{c, d} Means with different superscripts differ significantly (P<.10).

Effect of Treating Fescue Pasture with Mefluidide on Subsequent Feedlot

Performance of Grazing Steers

Lyle W. Lomas

Summary

A finishing study was conducted to determine the effect of grazing fescue pasture treated with mefluidide on future feedlot performance of stocker steers. Cattle that had previously grazed untreated control pastures gained more in the feedlot than those that had grazed mefluidide-treated pastures. As a result, overall performance from the beginning of the grazing period through the end of the finishing phase was similar for steers that had previously grazed control and mefluidide-treated pastures.

Introduction

Mefluidide is a plant growth regulator that is capable of improving forage quality and subsequently increasing weight gains of livestock consuming this forage. Mefluidide increases forage quality by delaying maturity and suppressing seed head formation. This study was conducted to determine the effect of treating tall fescue with mefluidide on grazing and subsequent feedlot performance of stocker steers.

Experimental Procedure

Four 5-acre Kentucky 31 fescue pastures with an average Epichloe typhina endophyte level of 85% were used to evaluate the effect of mefluidide treatment on grazing steer performance during the summer and fall of 1984. All pastures were topdressed with 80-40-40 lb of N-P₂O₅-K₂O per acre on February 6, 1984 and with 50 lb of N per acre on September 13, 1984. On April 17, 1984, 1 pint of Embark 2-S^(R) in 30 gallons of water per acre, plus X-77 surfactant at 1 pint per 100 gallons of spray solution, was applied to two of the pastures using a field sprayer with flat fan nozzles. At the time of mefluidide application, the fescue was approximately 4 inches tall. Two control pastures were not treated with mefluidide.

Thirty-two Angus x Hereford steers were used to graze these pastures. On April 17, all steers were implanted with Ralgro^(R), dewormed with Tramisol^(R), and randomly assigned to the four pastures (8 steers per pasture). Grazing was initiated on control pastures on April 17, but steers were not allowed to graze the mefluidide-treated pastures until May 1 because of a 14-day grazing restriction following mefluidide application. During the 14-day period, steers assigned to the mefluidide pastures were grazed on smooth bromegrass and then reweighed before they were turned^(R) onto the treated fescue pastures. All steers received 150 mg of Rumensin^(R) in 2 lb of rolled milo per head daily throughout the grazing phase and were

reimplanted with Ralgro^(R) on August 21. The grazing phase was terminated on November 27, 1984 and the cattle were placed in the feedlot and all fed the same finishing ration.

During the finishing phase, all cattle were started on 60% corn silage, 30% dry whole shelled corn, and 10% supplement. The level of silage was decreased and the level of corn increased by 5% daily, until the final ration of 15% corn silage, 75% dry whole shelled corn, and 10% supplement on a 100% dry matter basis was reached. Rumensin^(R) and Tylan^(R) were fed at 30 grams and 10 grams per ton of dry matter, respectively. Cattle were fed ad libitum once daily in fenceline bunks in dirt lots^(S) with no cover or wind protection. All steers were implanted with Synovex-S^(S) on November 27, 1984 and again on March 19, 1985. Initial and final weights were taken following a 16-hour shrink from both feed and water. Cattle were fed for 139 days and then slaughtered and carcass data was collected for each steer.

Results

Results of the grazing phase are listed in Table 9. Average daily gains of steers grazing control and mefluidide treated pastures were 1.47 and 1.68 lb per head daily, respectively. Steers grazing pastures treated with mefluidide gained 14.3% more (.21 lb per head daily) than those grazing control pastures. Pastures treated with mefluidide produced 37.6 lb more steer liveweight gain per acre than untreated control pastures. Mefluidide application also resulted in approximately 90-95% suppression of fescue seed heads.

Results of the finishing phase are listed in Table 10. During the finishing phase, cattle that had previously grazed the control pastures gained 8.2% more (28 lb) (P<.10) than those that had previously grazed mefluidide-treated pastures. No other differences in performance or carcass characteristics were observed.

Overall performance from the beginning of the grazing phase through the end of the finishing period is listed in Table 11. Overall performance was similar for steers that grazed the untreated control and mefluidide-treated fescue pastures.

Table 9. Effect of Mefluidide on Grazing Steer Performance.

<u>Item</u>	<u>Control</u>	<u>Mefluidide</u>
No. of steers	16	16
Initial wt., lb	416	446
Final wt., lb	746	799
Total gain., lb	330	353
Days on experiment	224	210
Average daily gain, lb	1.47 ^a	1.68 ^b
Stocking rate, steers/acre	1.6	1.6
Liveweight gain/acre, lb	528	565

^{a, b} Means with different superscripts differ significantly (P<.01).

Table 10. Effect of Mefluidide Treatment of Fescue Pasture on Subsequent Finishing Performance of Grazing Steers (139 days).

Item	Control	Mefluidide
No. of steers	16	16
Initial wt., lb	746	799
Final wt., lb	1095	1120
Total gain, lb	349 ^a	321 ^b
Average daily gain, lb	2.50 ^a	2.31 ^b
Daily dry matter intake, lb	20.22	19.40
Dry matter intake/gain	8.08	8.40
Hot carcass wt., lb	667	692
Ribeye area, in ²	12.1	12.1
Fat thickness, in	.31	.38
Quality grade	Ch	Ch-
Yield grade	2.3	2.3

a, b Means with different superscripts differ significantly (P<.10).

Table 11. Effect of Mefluidide Treatment of Fescue Pasture on Overall Steer Performance.

Item	Control	Mefluidide
No. of steers	16	16
Initial wt., lb	416	446
Final wt., lb	1095	1120
Total gain., lb	679	674
Days on experiment	363	349
Average daily gain, lb	1.87	1.93



Effect of Energy Supplementation on Gains of Steers Grazing Bermudagrass

Lyle W. Lomas

Summary

The effect of feeding 0, 2, or 4 lb of rolled milo per head daily on performance of stocker steers grazing bermudagrass pasture was evaluated. Steers that received 2 and 4 lb of energy supplement per head daily gained significantly more than those that received no supplement. Steers that received 4 lb of supplement per head daily gained significantly more than those that received 2 lb of grain per head daily.

Introduction

Supplementation with energy is an effective way of increasing gains of grazing stocker cattle. Hand feeding energy supplements gives the cattleman an opportunity to check his cattle and observe them for health problems on a regular basis. Energy supplements also serve as a carrier for lasalocid or monensin and other feed additives that might be beneficial. This study was conducted to evaluate the effect of energy supplementation on gains of stocker cattle grazing bermudagrass.

Experimental Procedure

Forty-two yearling mixed crossbred steers with an initial weight of 680 lb were randomly allotted by weight and divided into three equal groups of 14 head each on June 11, 1984 and placed on three 5-acre Midland bermudagrass pastures. One group of steers received no energy supplementation, while the other two groups received 2 or 4 lb of rolled milo plus 150 mg of Rumensin^(R) per head daily. On July 9, 1985, seven steers from each of the three groups were placed in one of three 5-acre Hardie bermudagrass pastures for the remainder of the study. Steers were rotated among pastures within each variety at 14-day intervals to minimize the effect of pasture differences. All pastures were fertilized on May 16, 1985 with 150-60-80 lb of N-P₂O₅-K₂O per acre. The Midland pastures were fertilized with an additional 50 lb of N per acre on July 25, 1985. All steers were implanted with Synovex-S^(R) and dewormed with Tramisol^(R) at the start of the study. Initial and final weights were taken following a 16-hour shrink from feed and water. The study was terminated October 1, 1985.

Results

Results of this study are presented in Table 12. Steers receiving 2 and 4 lb of energy supplement per head daily gained 50.0% more (46 lb) (P<.01) and 98.8% more (90 lb) (P<.01), respectively, than the unsupplemented control

group. Feeding 4 lb of supplement per head daily resulted in 32.5% more gain (44 lb) ($P < .01$) than feeding 2 lb per head daily. Following termination of this study, steers were placed in the feedlot to determine the effect of energy supplementation while grazing bermudagrass on subsequent feedlot performance. These results will be reported in a future publication.

Table 12. Energy Supplementation of Steers Grazing Bermudagrass (112 days).

Item	Level of Milo (lb/head/day)		
	0	2	4
No. of steers	14	14	14
Initial wt., lb	680	680	680
Final wt., lb	772	818	862
Total gain, lb	92 ^a	138 ^b	182 ^c
Average daily gain, lb	.82 ^a	1.23 ^b	1.63 ^c

a, b, c Means with different superscripts differ significantly ($P < .01$).



Heterosis in Simmental-Angus Rotational-Cross Calves

Lisa A. Kriese¹, Robert R. Schalles²,

and Lyle W. Lomas

Summary

Heterosis estimates were determined for gestation length, birth weight, and yearling weight using a two-breed rotational crossbreeding system with Angus and Simmental cattle. Heterosis for gestation length was -.3%; birth weight, 8.31%; weaning weight 5.05%, and yearling weight, 5.39%. Angus-sired calves from Simmental dams were significantly heavier at weaning and as yearlings than calves of the reciprocal cross.

Introduction

Systematic crossbreeding in beef cattle is a useful tool for commercial cattlemen, resulting in an efficient, autonomous breeding program with a minimal loss in heterosis.

It has been well documented that heterosis can be utilized well by the cow-calf producer, since the greatest amounts of heterosis are expressed in pre-weaning traits. The established cow herd should be crossed with a different sire breed. This first cross allows for maximum heterosis. However, if there is no breeding system, large losses in heterosis can occur after crossbred replacement heifers are placed into the herd.

Some type of crossbreeding system should be used to produce maximum obtainable heterosis in the offspring. Rotational crossbreeding is such a system, in which all replacement heifers are produced and only purebred sires need to be purchased. The rotational system should be developed to match the management of the operation.

A two-breed rotational crossbreeding system was initiated at Southeast Kansas Experiment Station utilizing Angus and Simmental cattle. Reproductive, preweaning, postweaning, and carcass data were collected and heterosis values were determined for gestation length, birth weight, weaning weight, and yearling weight.

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Experimental Procedure

Data were collected on 425 cows and their progeny at the Southeast Kansas Agricultural Experiment Station from 1979 to 1985. Hereford cows, present at the station in 1979, were gradually eliminated and replaced with Simmental and Angus straightbred and crossbred cows. A two-breed, rotational crossbreeding system was initiated in 1980. Twenty females each were maintained in purebred Simmental and purebred Angus herds to use as comparisons. Forty cows were maintained in a two-breed, rotational crossbreeding herd. The existing cows were divided into three groups; two were kept at Parsons and one at Mound Valley. Average cow weights were 1054.82 ± 83.24 lb for purebred Simmental, 986.83 ± 101.58 lb for purebred Angus, and 1008.81 ± 92.43 lb for the crossbred cows. The cows were pastured primarily on fescue and native grass and supplemented with hay and concentrate when needed during the winter months.

From 1979 to 1983, two groups calved in the fall and one group in the spring. Fall-calving cows began calving in late August or early September and continued through November. Spring calves were born in late August or early September and continued through November. Spring calves were born in late February through May. All groups were bred AI with Angus and Simmental bulls, which were also used for cleanup. The breeding season lasted 60 to 90 days.

In 1984, the spring-calving herd was eliminated and switched to fall calving. Calves were weaned at approximately 205 days of age. Replacement heifers were selected from offspring or bought from purebred producers, and steer calves were sold or placed in the feedlot. First calf heifers were bred to Angus bulls and then placed into the rotation. All calves received creep feed, except in 1979 when spring-born calves and half of the Parsons, fall-born calves did not receive creep feed.

Data were collected on calving ease, gestation length, birth weight, weaning weight, and yearling weight. All records that were used in developing models for gestation length, birth weight, weaning weight, and yearling weight also were used in calculating heterosis values. From 1980 on, feedlot performance and carcass data were collected on the steers. Traits measured included days on feed, average daily gain, final weight, carcass weight, quality grade, yield grade, ribeye area, and backfat thickness.

Heterosis was calculated using least squares means for gestation length, birth weight, weaning weight, and yearling weight (Table 13). Only 82 observations were used in calculating heterosis estimates, since other observations included Hereford blood, and a base Hereford population was not maintained after 1979.

Reciprocal cross means were also calculated. Sire and dam breeds were taken into account in calculating least squares means and standard errors for birth weight, weaning weight, and yearling weight. Least squares means for dam breeds were an indication of maternal heterosis.

Results

Simmental calves were sired by Abricot, Eagle, Mr. PR, Alpine Polled Proto, Cezon, Bar 5 Fantastic, Formula 10, CPS, Lightning, AR Extra 8J, and

sons of these bulls. The eight purebred calves comprising the basis for comparison had an average gestation length of 292 ± 2.1 days and birth weight of 77.4 ± 5.8 lb. Adjusted weaning weight average was 538.2 ± 26.9 lb and average for yearling weight was 683.1 ± 36.6 lb.

Forty-one Angus calves, sired by PS Power Play, Dalebanks Rito 9144, Dalebanks Barometer 0829, Dalebanks Skymere 9238, Dalebanks Benchmark 0505, Thomas Chaps, and Ken Caryl Mr. Angus, characterized the purebred Angus population. Average gestation length for purebred Angus was 284 ± 2.52 days, with an average birth weight of 70.34 ± 2.95 lb. Average adjusted weaning weight was 537.5 ± 15.41 lb and yearling weight was 672.97 ± 19.82 lb.

The crossbred population was sired by bulls used in the purebred Simmental and Angus populations. The results are based primarily on the F_1 generation. Six F_2 calves have been produced thus far in the study. Twenty-six 50% Simmental, ²50% Angus calves were born. Of the 26 F_1 calves, 15 were sired by Simmental bulls and 11 were sired by Angus bulls.

Average gestation length was 287 ± 2.69 days and birth weight average was 80.0 ± 4.21 lb for the 50% Angus, 50% Simmental calves. Weaning weight average was 565.1 ± 18.37 lb and yearling weight average was 714.4 ± 47.65 lb.

Table 14 gives heterosis for birth weight, gestation length, weaning weight, and yearling weight by percentage of breed in the calves. The most reliable heterosis values are associated with 50% Angus-50% Simmental calves, which included most of the calves in the heterosis analysis. All heterosis values in that group are very similar to previously published reports.

The reciprocal F_1 crosses favor the Angus-sired calves raised by Simmental dams. Those calves were 4.76 lb heavier at birth, 72.63 lb heavier at weaning, and 52.33 lb heavier as yearlings compared to the reciprocal cross. In the parent populations, purebred Simmental calves outweighed purebred Angus calves at birth, weaning, and as yearlings. The differences between the reciprocal cross calves cannot be totally explained by differences in milk production between the two breeds of dam.

Studies of rotational crossbreeding systems indicate that high levels of heterosis are sustained in successive generations. The F_1 crosses produced thus far should express maximum individual heterosis. As F_1 females are retained in the herd, subsequent generations in the two-breed, rotational crossbreeding system should show decreased individual and maternal heterosis.

Previous studies have shown that both individual and maternal heterosis will stabilize to two-thirds of the maximum heterosis in seven generations, using a two-breed, rotational crossbreeding system.

Table 13. Least Squares Means and Standard Errors by Trait and Percentage of Angus and Simmental in Calves Used to Calculate Heterosis Values.

% breeding of calf		No. born	Trait			
Simmental	Angus		Birth weight (lb)	Gestation length (days)	Weaning weight (lb)	Yearling weight (lb)
0	1	41	70.34 (2.95)	283.9 (2.52)	537.50 (15.41)	672.97 (19.82)
1/8	7/8	2	83.33 (10.25)	293.0 (3.48)	596.79 (36.46)	746.26 (51.39)
1/4	3/4	2	68.12 (10.60)	-	489.43 (41.56)	632.29 (58.89)
1/2	1/2	27	80.03 (4.21)	287.0 (2.69)	565.04 (18.36)	714.30 (27.80)
5/8	3/8	2	85.98 (10.41)	303.7 (4.53)	619.06 (49.69)	803.14 (68.92)
1	0	8	77.38 (5.73)	292.1 (2.07)	538.15 (26.85)	683.10 (36.55)

¹Standard errors are in parentheses.

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Table 14. Percent Heterosis for Birth Weight, Weaning Weight, Yearling Weight, and Gestation Length.

Simmental % in calf	Heterosis (%) ¹			
	Birth Wt.	Weaning Wt.	Yearling Wt.	Gestation Length
1/2	8.31 (27) ²	5.05 (26)	5.39 (13)	-.30 (10)

¹Heterosis = ((Crossbred Avg. - Weighted Purebred Avg.)/Weighted Purebred Avg.) * 100. Weighted purebred average = (Angus mean * % Angus in calf) + (Simmental mean * % Simmental in calf).

²Numbers in parentheses indicate number of observations.



Winter Wheat Response to N Rate, Seeding Rate, Fungicide, and Growth Regulator

Kenneth Kelley and Gary Paulsen¹

Summary

Winter wheat yields were increased significantly from a systemic fungicide application and from a higher seeding rate (120 lb/a), when Arkan wheat was planted in mid-November in an intensive wheat management study. Nitrogen that was applied in both fall and late winter (total N of 150 lb/a) reduced yields an average of 3 bu/a compared with a 75 lb/a N rate that was only fall-applied. The use of a growth regulator significantly reduced plant lodging, when both a high N rate and a high seeding rate were used, but grain yields were not improved.

Introduction

The intensive management of winter wheat is a new concept that has generated considerable interest in the wheat growing areas of the U.S. It has been adopted as a standard practice for producing wheat in European countries, but has not been fully evaluated for the Great Plains wheat area. The specific inputs that were evaluated included the combined effects of N rates, seeding rates, fungicide, and growth regulator.

Experimental Procedure

Soybeans were harvested from the experimental site in early November of 1984. Arkan wheat was planted on November 14 at two seeding rates, 60 and 120 lb/a. All plots received a preplant application of 60 lb/a of P_2O_5 and K_2O . Nitrogen fertilizer (urea) was applied at 75 lb N/a to all the plots in the fall as a preplant treatment. Another 75 lb/a of N was applied as a late-winter topdressing treatment on 8 of the 16 plot treatments. Cerone, a growth regulator, was applied at 1 pt/a on April 25, at the boot stage of wheat development. Tilt, a systemic fungicide, was applied at 4 fluid oz/a on May 3, after the flag-leaf emerged.

Results

Although the study was planted somewhat late and excessive rainfall in the spring was not particularly conducive for good wheat growth, wheat yields still ranged from 58 to 74 bu/a. Because of the delayed planting and reduced tiller development in the fall, the higher seeding rate significantly increased yields by an average of 5 bu/a. The higher N rate of 150 lb/a, however, reduced yields by an average of 3 bu/a compared to the 75 lb/a of N applied only in the fall. The use of a fungicide (Tilt) increased yields another 6 bu/a. Yields were not increased as a result of the growth regulator

(Cerone), but lodging was significantly reduced and test weight was higher.

More data are needed before definite conclusions are reached regarding all of the specific inputs in the intensive management system. Data in 1985 included a later than normal planting date for southeastern Kansas. If the planting date were in early October, previous research has shown that the higher seeding rate would probably not have been as significant. High N rates, also, do not appear to be necessary for high grain yields; however, grain protein may be improved. During wet, cool conditions in the spring, a fungicide reduces leaf disease problems and appears to significantly increase grain yield and quality.

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Table 15. Evaluation of Inputs in an Intensive Management Program for Hard Red Winter Wheat, Columbus Field - 1985.

Seeding Rate	N Rate	Tilt	Cerone	Yield	Kernels Spike ⁻¹	Kernel Wt.	Test Wt.	Grain Protein	Grain Sed.
lb/a	lb/a	oz/a	pt/a	bu/a		mg	lb/bu	%	cc
60	75	0	0	58.8	35	34	59.2	14.2	90
60	75	0	1	60.6	36	32	57.0	14.3	88
60	75	4	0	72.5	33	35	61.1	13.5	78
60	75	4	1	65.0	33	33	60.7	13.9	86
60	150	0	0	57.9	33	34	58.7	14.4	88
60	150	0	1	64.0	33	32	60.0	14.0	88
60	150	4	0	62.1	31	34	60.2	13.9	83
60	150	4	1	67.0	33	35	59.2	13.5	87
120	75	0	0	66.7	34	34	59.7	14.2	90
120	75	0	1	62.5	36	32	58.2	14.3	88
120	75	4	0	72.0	32	34	59.4	14.6	91
120	75	4	1	72.3	31	34	60.7	14.3	86
120	150	0	0	73.8	32	32	60.7	14.6	88
120	150	0	1	63.7	32	35	60.5	13.8	88
120	150	4	0	70.1	33	34	60.2	13.8	86
120	150	4	1	66.4	32	33	58.5	14.2	89
LSD (0.05)				5.7	4	3	1.4	0.8	7
C.V. (%)				8.6	8	6	1.6	1.6	6

Planting date: Nov. 14, 1984

Variety: Arkan

Previous crop: Soybeans

Fertilizer: Nitrogen applied in the fall (75 lb/a) on all treatments, plus an additional 75 lb/a of N applied in late winter on half the plots.

Phosphorus and potassium applied over all treatments (60 P₂O₅ and 60 K₂O). N source was urea.

Growth regulator (Cerone) applied April 25 - boot stage of wheat development.

Fungicide (Tilt) applied May 3 - flag leaf emergence.

Selected Wheat Varieties Compared Over Three Nitrogen Application Dates

Kenneth Kelley

Summary

Ten winter wheat varieties were compared when N fertilizer was applied over three different application dates (fall, late winter, and fall + late winter). N rates were 75 or 125 lb/a, applied as urea. Climatic conditions were not favorable for good winter wheat growth, but there was no significant yield difference over the three N application times. Varieties that were more resistant to leaf rust and septoria leaf blotch were in the higher yielding group. These included Arkan, Pioneer 2165, and Caldwell.

Introduction

Selected winter wheat varieties have been compared over three nitrogen rates (50, 100, and 150 lbs/a) from 1982-84. When wet, cool conditions have existed during late spring in southeastern Kansas, high nitrogen rates have been detrimental to grain yields. Beginning in 1985, selected wheat varieties were compared when N applications were applied in fall and late winter to see if better N efficiency might result from the split application rather than from a single application of N in the fall at planting time or from a top-dressing treatment in late winter.

Experimental Procedure

Ten winter wheat varieties were planted Nov. 12, 1984 at the Parsons field, following the harvest of a soybean crop. Urea was applied at 50 lbs/a of N as a preplant broadcast treatment, or as a late winter top-dressing treatment, or as two separate N treatments in the fall and again in late winter. Twenty-five lbs/a of N also was applied with the drill at planting time along with 50 lbs/a of P₂O₅. Potash was applied as a broadcast preplant treatment at 75 lbs/a of K₂O. The late winter N treatment was applied on March 20, 1985.

Results

Water-logged soil conditions in the spring, as well as a heavy thunderstorm at the time that the frost layer was leaving the soil in early spring, resulted in severe plant damage in 1985. McNair 1003 was particularly damaged by plant heaving. Plants also did not produce as many tillers as normal because of the later planting date. Leaf rust and septoria leaf blotch reduced the yields of the susceptible varieties.

Arkan, Pioneer 2165, and Caldwell were in the top yielding group. There were no significant differences among the varieties over the three N applications. Results from 1985 are shown in Table 16.

More evaluations are planned to determine if split N applications result in more efficient use of N in shallow soils of poor aeration, which are often water-logged during rainy periods in the spring.



Table 16. Selected Wheat Varieties Compared Over Three Nitrogen Applications Parsons Field, 1985.

	Yield, bu/a				Test Wt. lb/bu				Lodging, %				Grain Protein, %				Date Headed
	Time and Rate of N				Time and Rate of N				Time and Rate of N				Time and Rate of N				
	F	LW	F+LW	Avg	F	LW	F+LW	Avg	F	LW	F+LW	Avg	F	LW	F+LW	Avg	
	50N	50N	100N	Avg	50N	50N	100N	Avg	50N	50N	100N	Avg	50N	50N	100N	Avg	
<u>Hard Wheat</u>																	
Arkan	41.4	39.2	45.5	42.0	58.0	56.0	58.3	57.4	47	43	53	48	15.3	15.8	15.5	15.5	May 7
Bounty 202	26.9	27.6	28.8	27.8	49.7	48.7	50.7	49.7	48	60	40	49	15.5	16.1	15.5	15.7	May 7
Chisholm	28.5	25.1	28.9	27.5	55.3	53.7	55.3	54.8	63	52	53	56	14.1	14.4	14.0	14.2	May 7
Pioneer 2165	42.4	42.3	44.6	43.1	57.0	57.3	58.0	57.4	5	0	3	3	15.2	15.5	15.2	15.3	May 7
Pro Brand 830	22.4	21.6	20.5	21.5	49.7	50.7	50.7	50.3	43	47	43	44	14.8	15.3	15.3	15.1	May 11
Tam 105	22.6	21.7	21.7	22.0	50.0	48.3	48.3	48.9	33	70	53	52	15.0	15.7	15.3	15.3	May 11
Tam 107	29.9	24.5	26.3	26.9	51.7	51.3	52.0	51.7	63	63	75	67	14.4	14.7	14.6	14.5	May 8
Agripro Wrangler	31.1	31.9	31.6	31.5	56.0	56.3	57.0	56.4	40	47	30	39	14.4	14.8	14.8	14.7	May 6
<u>Soft Wheat</u>																	
McNair 1003 (*)	13.9	11.6	17.6	14.4	48.0	48.0	47.0	47.7	7	10	10	9	13.9	14.6	14.6	14.4	May 9
Caldwell	45.7	37.7	43.5	42.3	56.0	53.0	54.7	54.5	15	5	15	12	13.2	12.8	12.9	13.0	May 9
Means	30.5	28.3	30.9	---	53.1	52.3	53.2	---	37	40	38	--	14.6	15.0	14.8	---	
LSD (0.05)																	
Nitrogen Means				ns				ns				ns				ns	
Variety Means				3.0				0.7				10				0.4	
Any Comparison				7.0				1.9				20				0.8	
Same Level of N				5.3				1.3				17				0.7	

Time of N applications: F= fall(Nov.12), LW= late winter(Mar.20), F+LW= fall + late winter

All plots also received 25 lb/a of N that was applied with the drill in the fall.

(*)- McNair 1003 lost over 80% of the final stand by plant heaving in late winter after a heavy rain.

Effects of Cropping Sequence on Soybean Yields

Kenneth Kelley

Summary

Full-season soybean yields were compared for four different cropping rotations: (1) wheat - doublecrop soybeans, (2) grain sorghum - soybeans, (3) wheat - fallow - soybeans, or (4) continuous soybeans. There have been no significant yield differences over a 4-year period where soybeans follow wheat, grain sorghum, or a wheat - doublecrop rotation. Yields of soybeans following soybeans, however, have been significantly lower, even though annual applications of phosphorus and potassium were made.

Introduction

Soybeans are the major cash crop for many farmers in southeastern Kansas. Typically, they are grown in several cropping sequences with wheat and grain sorghum, or in a doublecropping rotation with wheat. More information is needed to determine the agronomic effects of cropping sequences on soybean yields.

Experimental Procedure

In 1979, four cropping rotations were initiated at the Columbus field: (1) wheat - doublecrop soybeans - soybeans, (2) wheat - fallow - soybeans, (3) grain sorghum - soybeans, and (4) continuous soybeans.

Full-season soybean yields were compared across all four cropping systems on even-numbered years. Beginning in 1984, an identical study was started adjacent to the initial site so that full-season yield effects could also be compared on odd-numbered years. Fertilizer (80 lb/a N, 80 lb/a P₂O₅, and 80 lb/a K₂O) was applied only to the wheat or grain sorghum crop, with the exception of continuous soybeans, which were fertilized annually with 40 lb/a of P₂O₅ and K₂O.

Results

Soybean yield data are shown in Table 17. Four-year yield averages show no significant differences when soybeans follow wheat or grain sorghum. Doublecrop soybeans after wheat, also, have not influenced the full-season soybean yield. However, 1980 and 1984 had rather low yield levels, so the amount of nutrient removal was lower than normal. Soil nutrients are being analyzed each year, but so far no significant soil changes have been observed.

The crop rotation effect has a definite yield advantage for soybeans following wheat or grain sorghum. Continuous soybeans, even though they receive annual applications of fertilizer, produce from 2 to 4 bu/a less than soybeans grown in rotation with other crops grown in southeastern Kansas.

This study will be continued for several more years and more soil analyses are planned to evaluate any possible crop rotation effects on soil physical properties.

Table 17. Effects of Four Different Cropping Sequences on Soybean Yields, Columbus Field.

Cropping Sequence	Soybean Yield				
	1980	1982	1984	1985	4-yr avg.
	----- bu/A -----				
Soybeans following [Wheat- Doublecrop Soybeans]	12.6	28.0	11.8	31.9	21.1
Soybeans following Grain Sorghum	13.3	30.4	10.8	30.9	21.4
Soybeans following Wheat	12.8	31.9	12.0	29.5	21.6
Soybeans following Soybeans	10.3	27.2	12.1	27.9	19.4
LSD 0.05	1.0	3.0	n.s.	3.2	----

Fertilizer applied only to wheat or grain sorghum (80-80-80) except for continuous soybeans, which receive a yearly application of phosphorus and potassium (0-40-40).

Beginning in 1984, an identical cropping sequence study was started adjacent to the initial study that was started in 1979 so that soybeans could be compared equally each year across all four cropping sequences.

Agronomic Effects of Three Different Wheat and Soybean
Cropping Sequences on Crop Yields

Kenneth Kelley

Summary

Three different cropping sequences involving wheat and soybeans have been compared from 1982-85. The rotations include: (1) continuous doublecropping, (2) doublecropping once every 2 years, or (3) full-season crops with no doublecropping. Four N rates (25, 50, 75, and 100 lb/a) also have been evaluated within the wheat cropping sequences. Except for 1985, climatic conditions have not been very favorable for full-season or doublecrop soybeans. The different cropping rotations have not significantly affected wheat or soybean yields. Highest wheat yields have been where N rates were 50 to 75 lb/a.

Introduction

In southeastern Kansas, wheat and soybeans are the sole cash crops for many producers, who do not grow feed-grain crops like milo or corn. They are typically grown in three different types of cropping sequences: (1) continuous doublecropping, (2) doublecropping once every two years, or (3) full-season crops with no doublecropping.

The objectives of this study were (1) to determine the agronomic effects of continuous doublecropping soybeans after wheat and (2) to determine the amount of nitrogen contributed to the wheat crop by the soybeans in different cropping sequences.

Experimental Procedure

Beginning in 1982, a cropping rotation study involving wheat and soybeans was established at the Parsons field with a silt loam soil type. Three different cropping sequences were initiated: (1) wheat - doublecrop soybeans, (2) wheat - doublecrop soybeans - full season soybeans, and (3) wheat - wheat - full season soybeans. Essex was used for the full-season variety and Crawford or Sparks for the shorter maturing variety in doublecropping treatments. Wheat straw was burned and disced when soybeans were doublecropped.

All fertilizer was applied to the wheat crop in each of the cropping sequences. Phosphorus and potassium were broadcast and incorporated prior to planting. Five nitrogen treatments (0, 25, 50, 75, 100 lb/a) were included as sub-plots for each of the main cropping sequence plots. Nitrogen was applied as urea in late winter.

Wheat was harvested for grain from each of the N subplots, whereas soybean yields were averaged over all N treatments.

Results

There were no wheat yields reported in 1985 because excessive spring rains drowned out several of the wheat plots, so all wheat plots were disced up and prepared for soybean planting or for fall planted wheat. Soybean plots, full-season and doublecrop, were all planted with Crawford variety on June 26.

Soybean yields shown in Table 18 probably have not reflected an accurate comparison between full-season and doublecrop yields because climatic conditions have varied tremendously over the 5-year period. Unusually wet conditions in the spring also have not been very favorable for optimum wheat growth. Wheat yields reported from 1982-84 in Table 19 show a significant N response, with the 50 to 75 lb/a rate showing highest yields. Among cropping rotations, wheat following 2 years of soybeans tends to be somewhat higher in yield.

More data are needed before any valid conclusions are made regarding the agronomic effects of doublecropping or how wheat yields are influenced by cropping rotations and applied nitrogen rates.

Table 18. Effects of Wheat and Soybean Cropping Sequences on Soybean Yield, Parsons Field, 1981-85.

Cropping Sequence	Soybean Yield					5-yr avg.
	1981	1982	1983	1984	1985	
----- bu/A -----						
Wheat - doublecrop soy*	18.7	23.6	17.9	2.1	33.2	19.1
Wheat - doublecrop soy*- full season soy	18.0	23.0	16.9	2.0	31.6	18.3
Wheat - doublecrop soy - full season soy*	25.8	24.3	15.5	11.1	32.6	21.9
Wheat - wheat - full season soy*	25.7	24.9	14.5	12.8	32.1	22.0
LSD 0.05	3.7	n.s.	n.s.	2.9	n.s.	----

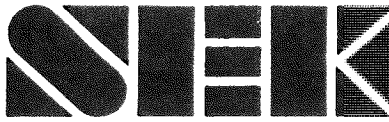
(*)- Indicates the crop for which soybean yields are reported.
Fertilizer applied only to the wheat crop in each crop rotation.
All soybean rotations (full-season and doublecrop) were planted on the same date in 1982 and 1985.

Table 19. Effects of Wheat and Soybean Cropping Sequences at Varying Nitrogen Levels on Wheat Yields, Parsons, 1982-84.

Cropping Sequence	Wheat Yield, bu/a					Avg
	Nitrogen, lb/a					
	0	25	50	75	100	
(Wheat * - soybean)	45.1	51.7	56.6	57.1	54.0	52.9
(Wheat * - soybean) - soybean	49.1	54.2	58.4	56.9	54.5	54.6
Wheat * - soybean	47.7	51.7	55.5	55.3	54.3	52.9
Wheat - wheat * - soybean	46.9	51.3	56.5	56.1	52.8	52.7
Means:	47.2	52.2	56.8	56.4	53.9	

LSD (0.05): Comparing N levels horizontally within the same cropping sequence = 1.6 bu/a
Comparing N levels between cropping sequences = 2.1 bu/a

(*) - Indicates the crop for which yields are reported.
Crops enclosed within [] represent doublecropping.



Comparisons of Tillage Methods for Doublecrop Soybeans and
Subsequent Effects on Full-Season Soybeans and Wheat in the Crop Rotation

Kenneth Kelley

Summary

Four tillage methods (plow, burn - disc, disc, and no-till) have been compared for doublecrop soybeans, when the cropping rotation is wheat - doublecrop soybeans - full season soybeans. Three-year results show no significant doublecrop yield differences among the plow, burn - disc, and disc tillage methods. No-till yields, however, have been significantly lower than those of the other tillage methods. Wheat and full-season soybean yields have not been affected by the doublecrop tillage methods after completion of two complete cropping cycles.

Introduction

Producers in southeastern Kansas typically grow doublecrop soybeans after wheat, where soil moisture and time permit. Various tillage methods are used, depending to some degree on the type of equipment that is available. The primary goals of doublecropping are to plant soybeans as quickly as possible after wheat harvest and produce acceptable grain yields as economically as possible. The short-term as well as long-term effects from the doublecrop tillage methods, however, should also be considered.

Experimental Procedure

Beginning in 1982, four tillage methods have been compared for doublecrop soybeans after wheat harvest at the Columbus field. Tillage methods were: (1) plow under stubble, (2) burn stubble and then disc, (3) disc stubble, and (4) plant no-till in stubble. The tillage study is alternated each year between two different sites so that doublecrop tillage methods can be compared yearly, when the cropping rotation is wheat - doublecrop soybeans - full season soybeans. Weed control is achieved with contact and residual herbicides, plus cultivation of all plots with a Buffalo cultivator. Plots are planted with a JD Maxi-emerge planter equipped with the conservation tillage attachment.

Results

Comparisons of tillage methods for doublecrop soybeans after wheat (Table 20) show no significant yield difference between plowing, burning, or discing the wheat stubble after a 3-year period. Soybeans planted no-till, however, have been significantly lower in grain yield, even though plots were cultivated later in the season with a heavy-duty Buffalo cultivator.

Initial seed emergence generally has been better where the stubble was plowed or burned and disced, especially where the top-soil moisture has been less than adequate for good seed germination.

Soil moisture measurements were taken in 1982 and 1983 at the mid-bloom stage of soybean development. There was no significant difference in soil moisture at the 4- to 8-inch and 8- to 12-inch depth for the plowed, burned, or disced treatments. The no-till plot had the highest soil moisture, which would be expected since the soil had not been disturbed by a tillage operation.

Results in Table 21 show that the doublecrop tillage methods have not affected the yields of the subsequent full-season soybeans or wheat that follow in the wheat - doublecrop soybean - full season soybean rotation after two complete cropping cycles. More data are needed, however, before the long-term effects from the various doublecrop tillage methods can be seen.



Table 20. Comparison of Tillage Methods for Doublecrop Soybeans, Columbus Field - 1982-85.

Tillage Method	Doublecrop Soybean Yield, bu/A			
	1982	1983	1985	3-yr Avg.
Flow, disc, roller harrow	26.1	25.2	32.9	28.1
Burn, disc, field cult.	25.8	24.2	32.1	27.4
Disc (2x)	26.6	23.2	30.3	26.7
No-till	26.3	20.5	24.7	23.8
LSD 0.05	ns	3.6	4.9	--

No yield data in 1984 because of poor stands and summer drought conditions.
Variety: Crawford

Table 21. Effects of Doublecrop Soybean Tillage Methods on the Subsequent Grain Yields of Wheat and Full-Season Soybeans in the Cropping Rotation, Columbus Field - 1985.

Doublecrop Soybean Tillage Method	Wheat			Soybean	
	Yield	Test Wt.	Grain Protein	Yield	Seed Size
	bu/A	lbs/bu	%	bu/A	gr/100
Flow	49.0	56	14.2	32.1	14.3
Burn, disc	49.2	57	13.1	32.5	14.5
Disc	49.3	56	13.8	32.3	14.7
No-till	48.8	56	13.6	33.3	14.4
LSD 0.05	ns	ns	ns	ns	ns
LSD 0.10	ns	ns	0.9	ns	ns
C.V. %	1.7	1.9	3.2	5.1	3.0

Cropping sequence is a [wheat-doublecrop soybean]- full season soybean rotation. The doublecrop tillage practices have been repeated through two cropping cycles prior to the wheat and soybean yields that are reported. The primary tillage method for the full-season soybeans was chiseling over all previous doublecrop tillage treatments. Prior to wheat planting, the soybean stubble was disced.

Wheat and Soybean Yields Compared in a Long-term Fertility
and Cropping Rotation

Kenneth Kelley

Summary

The long-term fertility requirements in a wheat - doublecrop soybean - full season soybean cropping rotation are being evaluated at the Columbus field. Highest grain yields have been produced where there has been a balanced fertility program of lime, phosphorus, and potassium. Residual manure treatments, also, have been beneficial.

Introduction

Wheat and soybeans are the major cash crops in much of southeast Kansas. Doublecropping soybeans after wheat, as well as growing three crops in 2 years (wheat - doublecrop soybeans - full season soybeans) is a common practice. Fertility requirements for wheat and soybeans in these systems have not been fully determined over a long period.

Experimental Procedure

The current cropping rotation consists of growing three crops in 2 years - (wheat - doublecrop soybeans - full season soybeans). All of the fertilizer is applied to the wheat crop, including three rates of phosphorus and potassium (50, 75, and 100 lb/a of P_2O_5 and K_2O) and a constant rate of 70 lb/a of nitrogen for all treatments. Manure has been a residual fertility treatment since 1982. Lime has been applied as needed to keep soil pH near 6.8. The wheat stubble has been burned every 2 years when doublecrop soybeans are grown after wheat. Soil nutrients are analyzed each year in the fall following soybean harvest.

Results

The highest wheat and soybean yields have been from the plots that have received a balanced fertility program. As of this date, the higher fertility rates of P and K have not increased grain yields over the lower level of 50 lb/a. Residual manure treatments that have also received additional P and K yield the highest, mainly because of the higher levels of soil P. Results are shown in Tables 22 and 23.

Where cropland in southeastern Kansas is intensively farmed, such as growing three crops in two years, soil fertility levels should be monitored closely in order to maintain adequate nutrition for the growing crops. In the low fertility soils of southeastern Kansas, lime and phosphorus are probably the most limiting nutrients for normal yield conditions; however, potassium also is needed to give a balanced fertility program.

Table 22. Soybean Yield Compared in a Long-Term Fertility and Cropping Rotation.

Fertility Treatments	Soybean Yield			
	Full-Season		Doublecrop	
	1985	1982-85	1985	1982-85
	----- bu/a -----			
Lime	27.6	16.9	18.9	16.0
Lime + 75 P ₂ O ₅	28.0	19.0	20.4	21.1
Lime + 50 P ₂ O ₅ + 50 K ₂ O	32.6	21.4	28.8	26.9
Lime + 75 P ₂ O ₅ + 75 K ₂ O	33.3	21.1	32.4	28.8
Lime + 100 P ₂ O ₅ + 100 K ₂ O	34.9	22.2	32.1	28.7
Lime + manure (residual)	37.8	22.7	27.9	27.3
Lime + manure (residual) + 75 P ₂ O ₅	37.4	24.4	28.5	28.8
Lime + manure (residual) + 75 P ₂ O ₅ + 75 K ₂ O	36.3	28.1	33.7	32.2
No lime or fertilizer	14.5	11.1	2.1	3.7

Fertility treatments applied to the wheat crop.

Table 23. Wheat Yield Compared in a Long-term Fertility and Cropping Rotation.

Fertility Treatments	1985 Wheat			
	Yield	Test		1981-85 Yield
		Wt	Protein	
	bu/a	lb/bu	%	bu/a
Lime	14	44	16.6	13
Lime + 75 P ₂ O ₅	38	57	14.9	34
Lime + 50 P ₂ O ₅ + 50 K ₂ O	61	56	13.9	47
Lime + 75 P ₂ O ₅ + 75 K ₂ O	64	57	14.2	47
Lime + 100 P ₂ O ₅ + 100 K ₂ O	61	55	14.5	48
Lime + manure (residual)	44	49	16.7	45
Lime + manure (residual) + 75 P ₂ O ₅	65	58	14.5	52
Lime + manure (residual) + 75 P ₂ O ₅ + 75 K ₂ O	70	56	14.4	53
No lime or fertilizer	10	52	16.8	10

All plots also received 75 lb/a of nitrogen.

Comparisons of Herbicides and Application Methods
for Velvetleaf Control in Soybeans

Kenneth Kelley

Summary

Velvetleaf, a problem weed in soybean fields, was controlled successfully with a split-application of metribuzin (Lexone/Sencor). One-half of the herbicide rate was applied immediately prior to planting and incorporated with a field cultivator, whereas the remaining one-half was applied preemergence, after planting. Other herbicides that gave good velvetleaf control included Scepter as a preplant incorporated treatment and Canopy applied preemergence. Postemergent treatments with Basagran + crop oil and Blazer + 10 - 34 - 0 were more weather dependent for good velvetleaf control.

Introduction

Broadleaf weeds, such as velvetleaf, are a problem in many soybean fields in southeastern Kansas. On light-textured, silt loam soils with less than 1.5% organic matter, the application rate of metribuzin herbicide (Sencor/Lexone) is critical in order to obtain control of broadleaf weeds without causing excessive soybean injury. A split-shot method of metribuzin application (part applied preplant and a second application after planting but before soybean emergence) has been promoted in order to obtain better broadleaf weed control with less injury to the soybean plants. This method has not been fully evaluated for the light-textured soils of southeastern Kansas.

In addition, other newer soybean herbicides that are not fully labelled for general farm use have not been evaluated for velvetleaf control in southeastern Kansas.

Experimental Procedure

From 1983-85, metribuzin was applied either 2 to 3 weeks prior to planting, immediately before planting, right after planting, or as a split-shot application. Application rates were 0.25, 0.38, 0.50, and 0.62 lb/a of active ingredient (a.i.). Preplant treatments were incorporated with a field cultivator equipped with a 3-bar tine mulcher. Several other labelled and experimental soybean herbicides were applied preplant, preemergence, or postemergence to compare with metribuzin for velvetleaf control. The plot area had a silt loam texture with 1.0 to 1.5 % organic matter and was heavily infested with velvetleaf.

Results

Three-year herbicide results with the split-shot method of metribuzin

(Sencor/Lexone) application and other selected herbicides for velvetleaf control are summarized in Table 24. Data for 1985 alone, which include several other experimental treatments, are shown in Table 25.

Velvetleaf control was better when metribuzin was applied close to planting time. Where metribuzin was applied with Treflan 14 to 21 days ahead of planting, a higher rate was needed and velvetleaf control was still variable.

The split-shot method of metribuzin application provided the most consistent control of velvetleaf over the 3-year evaluation. Even though the organic matter of the site was only 1.2%, there were no apparent crop injury effects with two applications of metribuzin at the rates used. When velvetleaf was a major problem, the split application with 0.25 lb/a a.i. applied preplant before planting, followed with another 0.25 lb of a.i./a after planting provided excellent control. For heavier soil types though, the preplant rate probably should be 0.38 lb a.i./a.

Metribuzin also was compared with other herbicides and application methods. Basagran with crop oil was more consistent than Amiben for postemergent control of velvetleaf, and also did not cause as much crop injury. Reward, applied preplant incorporated, provided good control, although in some instances seed germination appeared to be lower as noted by a visual observation. Final yields, however, were not reduced from the early crop injury. Lorox was tank-mixed with metribuzin as a preemergent treatment, which also gave good velvetleaf control.

In 1985, Scepter and Canopy were evaluated as experimental products. Scepter was incorporated preplant with Prowl, and the tank-mix gave excellent weed control. Canopy, applied premerge, also gave excellent control.

Climatic conditions varied during the 3-year test period. Dry conditions existed during 1983 and 1984, whereas 1985 was wetter than normal. In 1985 the velvetleaf population was determined. Competition from velvetleaf at 2, 4 to 6, and 10 plants/meter² reduced soybean yields 10 to 15, 15 to 35, and 70 %, respectively. Where velvetleaf competed heavily, however, soybean seed size was significantly larger, even though yields were substantially lower.

Velvetleaf is becoming a serious weed problem in many soybean fields of southeastern Kansas. Metribuzin, when applied as two separate treatments (preplant incorporated + premerge), provided a satisfactory method of controlling velvetleaf without excessive crop injury effects on light-textured soils with low organic matter. In addition, other herbicides that are currently labelled or in the experimental stage of development, offer good to excellent velvetleaf control.

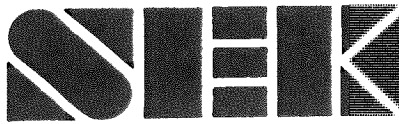
Table 24. Comparison of Soybean Herbicides for Velvetleaf Control, Columbus field, 1983-85.

Herbicide Treatment	Rate	When Applied	Velvetleaf Control				Soybean Yield			
			1983	1984	1985	Avg	1983	1984	1985	Avg
	lb a.i./a		----- % -----				----- bu/a -----			
Lexone/Sencor	.62	PPI(3wk)	90	92	78	87	14.0	7.1	31.3	17.5
Lexone/Sencor	.50	PPI(3wk)	68	87	78	78	14.7	6.0	31.6	17.4
Lexone/Sencor	.38	PPI(3wk)	62	83	74	73	14.2	6.2	28.1	16.2
Lexone/Sencor	.38	PPI	88	99	89	92	14.2	7.1	34.5	18.6
Lexone/Sencor	.38	PRE	70	78	88	79	16.0	7.2	35.8	19.7
Lexone/Sencor	.25	PPI(3wk)	25	58	15	33	10.2	4.5	15.8	10.2
Lexone/Sencor	.25	PPI	70	95	88	84	12.1	6.1	34.5	17.6
Lexone/Sencor	.25	PRE	62	47	83	64	13.2	6.6	34.1	18.0
Lexone/Sencor	.38 + .12	PPI(3wk) + PRE	83	95	85	88	13.2	6.1	34.2	17.8
Lexone/Sencor	.38 + .12	PPI + PRE	88	99	92	93	13.6	6.8	31.6	17.3
Lexone/Sencor	.38 + .25	PPI(3wk) + PRE	91	96	93	93	14.2	8.0	33.4	18.5
Lexone/Sencor	.38 + .25	PPI + PRE	93	99	99	97	16.8	7.2	32.1	18.7
Lexone/Sencor	.25 + .12	PPI(3wk) + PRE	77	80	87	81	12.1	6.6	31.9	16.9
Lexone/Sencor	.25 + .12	PPI + PRE	82	95	87	88	13.9	8.4	33.0	18.4
Lexone/Sencor	.25 + .25	PPI(3wk) + PRE	90	98	88	92	11.1	7.4	32.3	16.9
Lexone/Sencor	.25 + .25	PPI + PRE	94	94	98	95	13.6	9.4	31.0	18.0
Reward	2.4	PPI	85	98	88	90	12.0	7.6	31.5	17.0
Lexone/Sencor + Lorox	.25 + .25	PRE	85	83	96	88	12.8	8.0	34.0	18.3
Lexone/Sencor + Lorox	.25 + .38	PRE	88	75	91	85	12.5	6.5	35.0	18.0
Basagran + crop oil	1.0 + 2 pt	POST	85	78	90	84	12.2	6.5	34.2	17.6
Amiben + crop oil	2.4 + 2 pt	POST	75	50	81	69	11.9	5.3	32.6	16.6
Cultivation	---	---	40	40	45	42	8.5	4.5	25.3	12.8
No herbicide	---	---	0	0	0	0	7.1	3.6	16.6	9.1
LSD (0.05)	---	---	8	14	10	--	2.4	2.8	4.4	---

Table 25. Comparison of Soybean Herbicides for Velvetleaf Control, Columbus field - 1985.

Herbicide Treatment	Rate	When Applied	Vele Control		Vele Plants	Yield	Seed Size	Crop Injury
			Jul	Oct				
	lbs a.i./A		----	%	----	Pl/m2	bu/A	gr/100
Lexone/Sencor *	.625	PPI(3wk)	85	78	0.9	31.3	12.0	1.0
Lexone/Sencor *	.5	PPI(3wk)	78	78	1.0	31.6	11.8	1.0
Lexone/Sencor *	.38	PPI(3wk)	77	74	1.9	28.1	11.8	1.0
Lexone/Sencor *	.38	PPI	89	89	0.5	34.5	11.6	1.0
Lexone/Sencor *	.38	PRE	89	88	0.3	35.8	11.9	1.0
Lexone/Sencor *	.25	PPI(3wk)	17	0	9.6	15.8	12.8	1.0
Lexone/Sencor *	.25	PPI	92	88	0.4	34.5	11.8	1.0
Lexone/Sencor *	.25	PRE	87	83	0.8	34.1	11.9	1.0
Lexone/Sencor *	.38 + .12	PPI(3wk) + PRE	89	85	0.6	34.2	11.7	1.0
Lexone/Sencor *	.38 + .12	PPI + PRE	95	92	0.2	31.6	11.2	1.2
Lexone/Sencor *	.38 + .25	PPI(3wk) + PRE	92	93	0.2	33.4	11.5	1.0
Lexone/Sencor *	.38 + .25	PPI + PRE	97	99	0	32.1	11.4	1.3
Lexone/Sencor *	.25 + .12	PPI(3wk) + PRE	90	87	0.5	31.9	11.5	1.0
Lexone/Sencor *	.25 + .12	PPI + PRE	91	87	0.5	33.0	12.1	1.1
Lexone/Sencor *	.25 + .25	PPI(3wk) + PRE	89	88	0.3	32.3	11.6	1.0
Lexone/Sencor *	.25 + .25	PPI + PRE	95	98	0.1	31.0	11.8	1.3
Reward + Treflan	2.4 + .75	PPI	95	88	0.4	31.5	11.9	2.1
Prowl + Scepter	1.0 + .125	PPI	96	97	0.1	31.2	11.9	1.5
Lexone/Sencor + Lorox *	.25 + .38	PRE	93	96	0.1	35.0	12.0	1.0
Lexone/Sencor + Lorox *	.25 + .5	PRE	94	91	0.3	34.4	12.0	1.0
Dual + Canopy	1.5 + .25	PRE	97	97	0.1	29.0	11.6	1.7
Dual + Canopy	1.5 + .38	PRE	98	100	0	25.7	11.6	1.9
Basagran + Crop Oil *	1.0 + 2 pt	POST	93	90	0.2	34.2	12.1	2.1
Amiben + Crop Oil *	2.4 + 2 pt	POST	73	81	1.6	32.6	12.0	3.5
Blazer + Basagran + Crop Oil *	.25 + .5 + 1 pt	POST	83	71	1.9	30.6	12.4	3.0
Blazer + Basagran + Crop Oil *	.38 + .5 + 1 pt	POST	87	72	1.6	30.3	12.3	3.0
Blazer + Basagran + 10-34-0 *	.25 + .5 + 2 pt	POST	88	80	1.1	32.9	12.1	2.3
Blazer + Basagran + 10-34-0 *	.38 + .5 + 2 pt	POST	89	80	1.5	33.2	12.6	2.4
Cultivation	---	---	74	45	4.6	26.7	12.3	1.0
Treflan	---	---	0	0	13.6	9.8	13.3	1.0
LSD .05			6	10	2.1	4.4	0.7	0.2
C.V. %			5	9	--	9	3	8

(*)- Plots also received a preplant application of Treflan



Soybean Herbicides Compared for Annual Grass and Broadleaf Weed Control

Kenneth Kelley

Summary

Forty soybean herbicide treatments were compared as preplant incorporated, preemergent, or postemergent for annual broadleaf and grass control. Several experimental herbicides were compared with the standard herbicides that are currently labelled. Good to excellent control of smooth pigweed occurred with nearly all of the treatments. Selection of a herbicide or tank-mix combination should be governed by the specific weed problem, the preferred method of application, and the individual soil type.

Introduction

There are many preplant, soil-incorporated, preemergent, and postemergent herbicides that selectively control annual grass and many broadleaf weeds in soybeans. Various climatic conditions, soil types, and application rates affect herbicide performance. Herbicide performance studies are useful to compare the currently labelled products under the climatic conditions of southeastern Kansas.

Experimental Procedure

Forty soybean herbicide treatments were compared on a silt loam soil at the Columbus field in 1985. Herbicide treatments were applied in 20 gallons per acre of water. Preplant incorporated treatments were mixed in the soil with two passes of a field cultivator equipped with a 3-bar tine mulcher. Shallow incorporated treatments received only one pass with the field cultivator. Major weed competition was from smooth pigweed, which was uniform over the entire plot area. There also was light competition from cocklebur, large crabgrass, and morningglory species.

Results

Good to excellent weed control was achieved with nearly all the preplant or preemergent tank-mix herbicide combinations. Weed control with the postemergent treatments was somewhat less, because of low humidity and dry soil conditions at the time of spraying; however, weed control was still good in most cases and yields were not reduced significantly.

Several newer herbicide products were evaluated in 1985. Scepter and Canopy performed well as preplant or preemerge applications. Scepter as a postemergent treatment was not as effective for pigweed control. Cinch, applied preemerge, appeared to be ineffective for pigweed and would need to be tank-mixed when broadleaves are a problem. Cobra, a postemergent herbicide, is

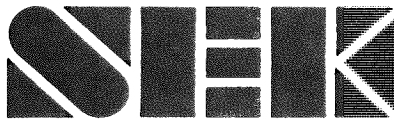
similar in activity to Blazer, which gave good pigweed control. Command, tank-mixed with Lorox or Lexone, gave good pigweed control, although it had the most activity on annual grasses and velvetleaf. All of the newer products are still under an experimental use permit (EUP) and will not be available for general farm use until a full label clearance is granted by the Environmental Protection Agency (EPA).

Crop injury effects from the various herbicide tank-mixes did not significantly influence yields. Several of the postemergent treatments caused moderate leaf burning, but had no effect on final yields.

Results show that there are a number of herbicide products that give good to excellent weed control. Selection of a herbicide or tank-mix combination should be governed by the specific weed problem, the method of application, and the soil type. Newer herbicides, when full label clearance is granted by the EPA, appear to be very beneficial to the soybean producer in southeastern Kansas for controlling several of the problem weeds that currently exist, such as velvetleaf, cocklebur, and some species of morningglory.

Table 26. Comparison of Soybean Herbicides and Method of Application for Pigweed Control and Effects on Yield, Columbus field- 1985.

Herbicide Treatment	Rate lbs a.i./A	When Applied	Snipw Control %	Yield bu/A
Treflan + Lexone	.75 + .38	PPI	100	39.2
Prowl + Sencor	1.0 + .38	PPI	98	39.0
Sonalan + Lexone	.75 + .38	PPI	92	38.3
Treflan + Reward + Sencor	.75 + 2.3 + .38	PPI	98	36.7
Prowl + Scepter	1.0 + .125	PPI	100	37.2
Lasso + Lexone	2.0 + .38	Shal PPI	98	40.2
Dual + Sencor	1.5 + .38	Shal PPI	100	40.6
Command + Lexone	1.0 + .38	Shal PPI	98	41.4
Cinch + Sencor	1.0 + .38	Shal PPI	97	32.8
Lasso + Scepter	2.0 + .125	Shal PPI	98	38.0
Dual + Scepter	1.5 + .125	Shal PPI	98	38.4
Lasso + Lorox	2.0 + .5	PRE	98	37.6
Dual + Lorox	1.5 + .5	PRE	98	37.9
Command + Lorox	1.0 + .5	PRE	93	39.1
Cinch + Lorox	1.0 + .5	PRE	83	31.5
Surflan + Lorox	.75 + .5	PRE	87	38.8
Lasso + Lexone	2.0 + .25	PRE	99	39.6
Dual + Sencor	1.5 + .25	PRE	96	37.3
Command + Lexone	1.0 + .25	PRE	98	40.3
Cinch + Sencor	1.0 + .25	PRE	92	34.5
Surflan + Lexone	.75 + .25	PRE	97	36.9
Dual + Canopy	1.5 + .25	PRE	100	37.6
Lasso + Canopy	2.0 + .25	PRE	100	38.6
Dual + Scepter	1.5 + .125	PRE	100	37.0
Lasso + Scepter	2.0 + .125	PRE	100	37.7
Cinch + Scepter	1.0 + .125	PRE	98	35.4
Lasso + Amiben	2.0 + 1.8	PRE	100	37.7
Lasso + Modown	2.0 + 1.5	PRE	100	38.7
Dual + Modown	1.5 + 1.5	PRE	100	37.5
Blazer	.375	POST	93	37.7
Blazer + Basagran + Poast	.25 + .5 + .2	POST-Seq.	90	41.0
Blazer + Basagran + Fusilade 2000	.25 + .5 + .2	POST-Seq.	88	38.8
Blazer + Basagran + Verdict	.25 + .5 + .125	POST-Seq.	93	40.1
Blazer + Basagran + Assure	.25 + .5 + .075	POST-Seq.	90	39.0
Blazer + Basagran + Whip	.25 + .5 + .2	POST-Seq.	88	38.0
Cobra + Verdict	.15 + .125	POST-Seq.	93	39.5
Tackle + Verdict	.5 + .125	POST-Seq.	78	35.0
Reflex + Verdict	.375 + .125	POST-Seq.	88	40.3
Scepter + Verdict	.125 + .125	POST-Seq.	78	37.0
No herbicide	---	---	0	27.3
LSD .05			7	3.0
C.V. %			5	5



Comparison of Postemergent Herbicides for Cocklebur Control
in Soybeans Planted in Narrow and Wide Row Spacings

Kenneth Kelley

Summary

Ten postemergent herbicides were evaluated for cocklebur control in soybeans planted in 7-inch rows, 30-inch rows, and 30-inch rows that were cultivated. In 1985, excellent cocklebur control was obtained when herbicides were applied 26, 34, or 39 days after planting. Soybean yields, however, were reduced by 15, 50, and 70 % when cocklebur competition was 2, 6, and 10 plants/ meter², respectively. Narrow row spacings increased yields 10 to 15 % and also helped reduce cocklebur growth and competition.

Introduction

Cocklebur is one of the major problem weeds in many of the soybean fields of southeastern Kansas. It is a strong competitor for available water, light, and nutrients. For the herbicides that are currently available, the postemergent method has given more consistent control of cockleburs. Various postemergent herbicides are available to control cockleburs at different growth stages, but the length of weed competition affects soybean yields. Some herbicides also tend to cause more leaf burning, which may affect yields. The effect of row widths may influence the competition of cockleburs, depending on the time of herbicide application.

Experimental Procedure

Ten postemergent herbicides for soybeans were compared in 1984 and 1985 at the Columbus field. The herbicide treatments were applied to each of three main blocks, which consisted of narrow rows (7-inch), wide rows (30-inch), and wide rows that were cultivated once. Herbicides were applied starting when the cockleburs were from 4 to 6 inches tall and continuing until they reached approximately 24 inches. Plots were cultivated approximately 1 week after postemergent herbicide treatments were applied.

Results

Growing conditions in 1985 were excellent for soybean and cocklebur alike. All herbicide treatments gave good to excellent control of cocklebur. Had rainfall not been above average in August and September, there might have been more significant yield differences where cockleburs competed with the soybeans for a longer period of time. The soybeans were never moisture stressed after late July until harvest time. Yields, however, were reduced by 15, 50, and 70 % when cocklebur competition was 2, 6, and 10 plants/ meter², respectively.

Row spacing affected yields significantly, with narrower rows producing the highest yield. Cultivating the wider spaced rows improved yields an average of 3 bu/a over plots that were not cultivated. Cultivation was a supplementary aid in removing herbicide stressed cocklebur between rows and also helped loosen the compacted soil for improved soybean root growth. Cocklebur competition was less intense where soybeans were grown in narrow rows. Evidently, the shading and canopy effect reduced cocklebur growth and vigor.

Crop injury effects from Dyanap and Rescue treatments did not appear to reduce overall yields; however, the effect on individual yield components was not evaluated in 1985. Studies planned for 1986 will attempt to determine if pod number or beans per pod are affected by postemergent herbicide treatments.

Reduced rates of Basagran applied 26 days after planting provided excellent control of cocklebur, especially when cultivation followed or when 7-inch row spacing was used. Adding 4 oz/a of 2,4-DB slightly improved cocklebur control and did not affect soybean growth.

Table 27. Comparison of Postemerge Herbicides for Cocklebur Control with Soybeans Planted in Narrow and Wide Row Spacings, Columbus Field, 1985

Herbicide Treatment	Product/A	When Applied	Yield			Cocb Control			Cocb Popul.			Seed Size			Crop Injury		
			Row Spacing			Row Spacing			Row Spacing			Row Spacing			Row Spacing		
		day after pl	N	W	WC	N	W	WC	N	W	WC	N	W	WC	N	W	WC
			bu/A			%			pl/m2			gr/100					
Basagran	1 pt	26	40.9	34.2	37.8	97	83	95	0.1	0.7	0.1	12.5	12.0	11.7	2.2	2.2	2.2
Basagran + 2,4,-DB	1 pt + 4 oz	26	38.7	33.4	37.8	99	90	99	0	0.4	0.1	12.2	11.6	11.7	2.2	2.2	2.2
Basagran	1.5 pt	26	40.2	35.8	35.8	97	92	99	0.1	0.3	0.1	12.3	12.1	11.8	2.2	2.2	2.2
Basagran + 2,4,-DB	1.5 pt + 4 oz	26	41.0	35.0	34.8	99	90	100	0	0.4	0	12.4	11.7	11.9	2.2	2.2	2.2
Basagran + Blazer	1 pt + 1 pt	26	37.7	35.0	35.5	97	86	100	0.1	0.8	0	12.5	11.7	11.7	2.5	2.5	2.5
Dyanap	3 qt	26	39.1	29.7	35.8	100	72	97	0	2.2	0.1	12.7	12.0	11.7	3.5	3.5	3.5
Basagran	1 qt	34	37.2	32.7	35.2	87	80	90	0.6	1.2	0.3	11.8	11.8	11.5	1.8	1.8	1.8
Basagran + 2,4,-DB	1 qt + 4 oz	34	41.0	33.5	35.7	92	78	97	0.3	1.1	0.1	12.3	11.9	11.6	1.8	1.8	1.8
Dyanap + 2,4,-DB	4 qt + 4 oz	34	40.3	33.9	34.7	93	85	91	0.2	0.7	0.4	11.7	11.4	11.6	2.8	2.8	2.8
Rescue	3 qt	39	40.6	29.4	31.3	100	99	100	0	0	0	12.0	12.3	12.0	3.2	3.2	3.2
No herbicide	---	--	22.0	13.5	28.2	0	0	45	6.4	10.8	2.1	12.4	11.8	11.8	1.0	1.0	1.0
Means			38.1	31.5	34.7	87	78	92	0.7	1.7	0.3	12.3	11.8	11.7	2.3	2.3	2.3
LSD .05	Row spacing			3.8			5			0.9			0.3			--	
	Herbicide trt			2.5			7			1.1			0.3			--	
	Row sp x herb trt interaction			*			*			*			ns			--	
	Same row spacing			4.3			13			1.9			--			--	
	Any comparison			5.5			13			2.0			--			--	
C.V. %				8			9			--			3			--	

Row spacing: N = 7-inch, W = 30-inch, WC = 30-inch + cultivation.

Crop injury: 1 = no injury, 5 = dead plants.

Date planted: June 20, 1985 Variety: Essex

Date of herbicide treatments: July 16, July 24, July 29

Surfactant added to all Basagran treatments (.25% v/v).

Cultivation occurred approximately one week after herbicide treatments.

Herbicide Systems Compared for Weed Control in Soybeans
with Narrow and Wide Row Spacings

Kenneth Kelley

Summary

Ten soybean herbicide treatments representing preplant incorporated, preemergent, or postemergent application methods were evaluated for annual grass and broadleaf weed control in 7-inch rows, 30-inch rows, and 30-inch rows that were cultivated. The weed spectrum was limited primarily to smooth pigweed in 1985, which was controlled adequately with all three methods of application. Pigweed that was allowed to compete for the entire growing season reduced soybean yields by 30 to 50 %.

Introduction

Soybean producers now have a good selection of available herbicides to apply for annual grass and broadleaf weed control. Herbicides can now be applied before planting with a tillage operation, after planting but before crop emergence, or after the crop and weeds have emerged. The particular method and time of application depends upon the herbicides selected, the weed species present, the climatic conditions, and the individual producer's management scheme. More information is needed on how these different herbicide systems compare in wide and narrow row spacings for weed control in the soybean fields of southeastern Kansas.

Experimental Procedure

In 1985, 10 herbicide treatments were compared for annual grass and broadleaf weed control in a split-plot design at the Columbus field. The three main treatments included a narrow row spacing (7-inch), a wide row spacing (30-inch), and a wide row spacing that was cultivated. The herbicide treatments were applied to each of the three main row spacing blocks. The treatments were selected to be representative of the different methods of herbicide application - incorporated preplant, preemergent, postemergent, or combinations of these.

Results

Climatic and environmental conditions in 1985 prevented some herbicide comparisons that had been previously planned. A 4-week dry period following the late June planting prevented most annual grass competition. Smooth pigweed was the predominant broadleaf weed competitor. Also, a heavy rainfall shortly after planting delayed some preemergent herbicide treatments that were planned, so only Dual was applied after the soybeans had already emerged. The Dual treatments, however, were not activated because of the dry period and several postemergent treatments were evaluated later for pigweed control.

When Dyanap and Blazer were applied postemerge following preplant treatments of Treflan or Treflan + Lexone, the primary objective was to see if the crop injury effect from these herbicides influenced final yields because excellent pigweed control had already been obtained with the initial applications. Even though leaf burning was moderately severe from these postemergent treatments, as well as from Cobra, final yields were not affected.

Grain yields were significantly higher in 1985 in 7-inch rows compared to 30-inch rows that were not cultivated. Cultivation improved weed control with some herbicide treatments and also improved yields an average of 3 bu/a over identical plots that were not cultivated.

Pigweed that was allowed to compete for the entire growing season reduced soybean yields by 30 to 50%. Since Verdict is not effective on pigweed, the pigweed competition effect with that treatment as well as in the control plot was used to estimate yield reduction. When pigweed was removed by cultivation within a month after planting, no significant yield reduction occurred.

Small-seeded, broadleaf weeds, like smooth pigweed, can be adequately controlled with several different herbicides and with various methods of application. If selected herbicides fail with one application method because of climatic conditions or heavy weed pressure, other postemergent herbicides can be applied without any reduction in yield, provided the weeds are controlled within 4 weeks of planting. Postemergent herbicides often result in a moderate amount of leaf burning; however, final yields are not usually affected.

Narrow row spacing is beneficial in suppressing weed growth because of the quicker canopy closing; however, cultivation is also an advantage where soils are compacted and for removing weeds between the rows.

Table 28. Herbicide Systems Compared for Pigweed Control in Soybeans with Narrow and Wide Row Spacing, Columbus Field, 1985.

Herbicide Treatment	Rate	When Applied	Smpw Control			Yield			Seed Size			Crop Injury		
			Row Spacing			Row Spacing			Row Spacing			Row Spacing		
			N	W	WC	N	W	WC	N	W	WC	N	W	WC
	lbs a.i./A		----- % -----			----- bu/A -----			----- gr/100 -----					
Treflan + Lexone	.75 + .38	PPI	98	100	99	33.9	32.2	31.6	11.6	11.1	11.5	1.0	1.0	1.0
Dual + Sencor	1.5 + .38	Shal PPI	97	98	100	34.3	29.5	30.0	11.4	11.2	11.4	1.0	1.0	1.0
Dual + Cobra	1.5 + .15	PRE + POST	97	95	100	33.8	32.3	32.8	11.7	11.2	11.2	3.3	3.3	3.3
Verdict + Blazer + Basagran	.125 + .25 + .5	POST	97	81	97	34.1	31.7	31.8	11.9	11.6	11.4	2.8	2.7	2.7
Treflan + Lexone + Dyanap	.75 + .25 + 2.25	PPI + POST	100	99	100	33.4	29.7	32.4	11.7	11.3	11.6	2.8	2.8	2.8
Verdict	.125	POST	0	0	25	27.1	17.3	26.1	11.4	11.9	11.3	1.0	1.0	1.0
Treflan + Blazer	.75 + .38	PPI + POST	100	100	100	32.2	31.6	32.4	11.5	11.4	11.1	2.5	2.5	2.3
Treflan	.75	PPI	98	100	98	33.0	30.0	33.1	11.6	11.5	11.3	1.0	1.0	1.0
Dual + Scepter	1.5 + .125	PRE + POST	94	97	100	32.4	28.9	27.7	11.3	11.5	11.1	1.5	1.5	1.5
Blazer + Basagran	.38 + .25	POST	97	85	100	33.6	30.8	32.2	11.6	11.7	11.6	3.2	2.7	2.7
No Herbicide	---	---	0	0	65	27.7	21.8	32.7	12.0	11.5	11.5	1.0	1.0	1.0
Means			80	78	89	32.3	28.7	31.2	11.6	11.5	11.4	1.9	1.9	1.8
LSD .05		Row spacing		3			2.7		ns			ns		
		Herbicide treatment		6			2.4		ns			ns		0.2
		Row sp x herbicide trt interaction		*			*		ns			ns		
		Same row spacing		10			4.1		--			--		
		Any comparison		9			4.7		--			--		
C.V. %				7			8			3			10	

Row spacing: N = 7-inch, W = 30-inch, WC = 30-inch + cultivation.
 Crop injury: 1 = no injury, 5 = dead plants.
 Date planted: June 20, 1985
 Date of herbicide trts: PPI= June 20, PRE= June 25, POST= July 16 and July 24
 Variety: Essex
 Weed competition: mainly smooth pigweed (smpw).
 Surfactant (.25 % v/v) added to postemergence, broadleaf treatments.
 Crop oil (1 %) added to postemergence, grass treatments.

Effect of Postemergent Herbicides on Soybean Yield
in the Absence of Weed Competition

Kenneth Kelley

Summary

Seven postemergent herbicides for soybeans were evaluated to determine what effect they might have on final crop yield in the absence of weed competition. Even though several herbicide treatments caused moderate to severe leaf burning or curling, final yields were not significantly affected.

Introduction

Postemergent herbicides are commonly used by soybean producers in southeastern Kansas to control problem broadleaf weeds, such as cocklebur, morningglory, velvetleaf, and pigweed. Moderate to severe leaf burning or curling on soybeans is quite noticeable with several of these herbicides, which is a concern to area producers. The effect on final soybean yield, however, is the most important consideration.

Experimental Procedure

In 1985, seven postemergent herbicides were evaluated to determine what effect they might have on final crop yield in the absence of weed competition.

Results

Yield data in Table 29 show no significant yield effect from the postemergent applications, even though leaf burning or curling was moderate to severe with Dyanap, Rescue, Cobra, and 2,4-DB.

Soybeans can tolerate a considerable amount of leaf injury without reduction of final yields. More information is needed, however, under more varying climatic conditions and at different soybean growth stages.

Table 29. Effect of Postemergent Herbicides on Soybean Yield in the Absence of Weed Competition, Columbus field - 1985.

Herbicide Treatment	Rate	Yield	Crop Injury
	Product/A.	bu/A	
Basagran	1 qt	30.5	1.5
Basagran + 2,4-DB	1 qt + 4 oz	28.2	1.5
Cobra	.8 pt	28.2	3.0
Dyanap	3 qt	29.7	3.5
Rescue	3 qt	29.0	4.0
Scepter	.67 pt	30.8	1.5
2,4-DB	.5 pt	29.7	2.5
No herbicide	---	29.4	---
LSD .05		ns	0.5
C.V. %		9	5

Variety: Essex

Planting date: June 20, 1985

Herbicide application date: July 29

Climatic conditions the day of herbicide application: Max temp: 90 F, relative humidity = 75%, cloudy sky.

Crop injury rating: 1 = no injury, 10 = dead plots.

Comparison of Soybean Herbicides for Late-Planted Doublecrop Soybeans

Kenneth Kelley

Summary

Fifteen soybean herbicide treatments were compared where doublecrop soybeans were planted in wheat stubble that had been disced twice. Yields were somewhat variable because of the late-July planting date. Volunteer wheat, however, did not prove to be a significant weed competitor in this study, even though stands were moderately thick.

Introduction

Doublecrop soybeans typically are planted after wheat in southeastern Kansas, if soil moisture is adequate for seed emergence. The tillage operation that is used to produce doublecrop soybeans sometimes limits the selection of herbicides. Where stubble is only disced, herbicides are commonly applied immediately after planting or after the crop and weeds have emerged.

Experimental Procedure

In 1985, 15 herbicide treatments were applied where wheat had been harvested, disced twice, and planted with a JD planter equipped with the disc-coulter attachment for planting in high residue conditions. Herbicides were applied preemerge or postemerge. The test was planted rather late in July; however, good showers occurred shortly before and after planting, so soil moisture was excellent for seed emergence and herbicide activation.

Results

Data are shown in Table 30. Grain yields were somewhat variable from the late planting date. The major weed competition was from volunteer wheat, with smooth pigweed competition being light and variable.

Command had an experimental use label (EUP) in 1985, but is very effective on annual grasses and volunteer wheat. Assure, Verdict, and Fusilade 2000 were applied postemerge and did a good job of controlling volunteer wheat.

Competition from volunteer wheat in doublecrop soybeans does not appear to be a significant problem, especially for late-planted soybeans. Often annual grasses and broadleaf weeds can be satisfactorily controlled with either preemergent or early postemergent herbicide applications, when doublecrop soybeans are planted in wheat stubble with a considerable amount of residue cover.

Table 30. Comparison of Soybean Herbicides for Late-Planted Doublecrop Soybeans After Wheat, Cherokee County -1985.

Herbicide Treatment	Rate	Method of Application	Weed Control		Yield
			Smpw	Vol wh	
	lbs a.i./a		---- % ----		bu/a
Goal	.375	Pre	89	13	13.1
Dual	1.5	Pre	95	58	12.3
Command	1.0	Pre	88	100	11.5
Cinch	1.0	Pre	20	78	6.8
Lasso	2.0	Pre	91	37	10.6
Lexone/Sencor	.375	Pre	83	48	17.8
Scepter	.125	Pre	99	55	13.7
Lorox	.75	Pre	91	17	8.8
Surflan	.75	Pre	98	95	9.5
Assure + Blazer	.075 + .25	Post (seq.)	95	100	11.9
Poast + Blazer	.2 + .25	Post (seq.)	94	85	10.0
Verdict + Blazer	.125 + .25	Post (seq.)	95	100	12.0
Fusilade 2000 + Blazer	.19 + .25	Post (seq.)	96	100	11.9
Whip + Blazer	.19 + .25	Post (seq.)	94	50	10.1
Blazer + 2,4-DB	.25 + .04	Post	98	0	10.0
Cultivated	--	--	65	77	11.7
No herbicide	--	--	0	0	10.6
LSD (0.05)			10	29	5.3
C.V. (%)			7	27	28

Variety: Williams 82

Planting date: July 23, 1985

Tillage: Wheat stubble disced

Date of herbicide treatments: Pre (preemergence) = July 24, 1985

Post (postemergence) = August 6 and 12, 1985

Surfactant (Triton AG-98) applied at a rate of 0.25% vol/vol with Blazer treatments. Crop oil (1%) added to all postemergence grass treatments.

Weed species: Smooth pigweed and volunteer wheat.

Grain Sorghum Hybrids Compared

Kenneth Kelley, George Granade, and Ted Walter¹

Summary

Seventy-eight grain sorghum hybrids were compared in the state-wide grain sorghum performance test. Despite the late-June planting date, yields ranged from 58 to 115 bu/a.

Introduction

Grain sorghum performance trials are designed to evaluate hybrids from private seed companies for grain yield and overall performance under southeastern Kansas climatic conditions.

Experimental Procedure

In 1985, 78 hybrids were compared at the Parsons field under dryland conditions. Hybrids were planted in 30-inch rows on June 25 and hand-thinned to 27,000 plants per acre. Fertilization was 115 lb/a N, 60 lb/a P₂O₅, and 60 lb/a K₂O. Ramrod-atrazine was applied for weed control. The previous crop was soybeans. Plots were machine harvested on November 6.

Results

Average grain yield for all hybrids was 91 bu/a, with a range of 58 to 115 bu/a. Excellent moisture conditions existed throughout the summer; however, late August and early September had a number of wet, cloudy days, which may have reduced grain yields somewhat. On Oct. 3, 28F was recorded, but grain sorghum was not injured.

Complete results of grain sorghum yields for Kansas in 1985 are compiled in Agric. Expt. Station Report of Progress 490.

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Comparisons of Grain Sorghum Herbicides for Weed Control

Kenneth Kelley

Summary

Twenty grain sorghum herbicide treatments were compared using conventional tillage methods. Smooth pigweed and annual morningglory were the major weed competitors. Even though the weed pressure was not severe, grain yields were reduced by approximately 20 bu/a, when weeds were allowed to compete for the entire growing season. There was no significant difference in weed control or grain yield between the different application methods, although some herbicides controlled morningglory and pigweed better than others.

Introduction

Grain sorghum is an important grain and feed crop for many producers of southeastern Kansas. It is often grown in rotation with wheat and soybeans, which helps in breaking up the weed cycle that often exists when a monocrop is grown. The use of safened seed has provided another alternative for selecting herbicides.

Experimental Procedure

In 1985 at the Columbus field, 20 herbicide treatments were compared under conventional tillage. The previous crop had been soybeans. Herbicides were applied either preplant and incorporated with a field cultivator equipped with a 3-bar tine mulcher, preemergence after planting, or postemergence when milo was 6 to 10 inches in height. Weed competition was not extremely heavy, with smooth pigweed and annual morningglory giving the most competition.

Results

Data from 1985 are shown in Table 31. Grain yields were reduced approximately 20% when weeds were allowed to compete with grain sorghum for the entire growing season, even though weed competition was only light to moderate. Crop injury was not apparent with any of the herbicide treatments that were evaluated.

Pigweed control was good to excellent for most of the treatments that were compared. Bladex was probably less effective for pigweed, although it is more effective for crabgrass than AATrex. Modown appears to be ineffective for ivyleaf and tall morningglory. Also, Bladex did not provide as much morningglory control as AATrex or the postemergent herbicides involving 2,4-D and Banvel. Since there was very little annual grass competition, the herbicide treatments could not be evaluated for crabgrass control.

Grain sorghum herbicides should be selected on the basis of known weed pressure and soil type. Where broadleaf weed species are the major problem, there are a number of different herbicides and application methods that will give satisfactory control. If annual grasses are the primary competitor, then the use of safened seed should be considered.

Table 31. Comparisons of Grain Sorghum Herbicides for Weed Control, Columbus Field-1985.

Herbicide Treatment	Rate	When Applied	Weed Control			Yield	Test Wt.
			Tamg	Smpw	Lacg		
	lb a.i./A		-----	%	-----	bu/A	lb/bu
Bladex	1.5	PPI	67	91	92	101	49
AAtrex	1.5	PPI	95	99	90	109	49
Bicep	2.7	PPI	90	99	96	108	50
Lasso + Bladex	2.0 + 1.5	PPI	82	83	92	103	47
Dual + Bladex	1.5 + 1.5	PPI	80	93	99	100	50
AAtrex + Bladex	1.0 + 1.5	PPI	94	100	97	103	49
AAtrex	1.5	PRE	95	99	92	110	49
Bicep	2.7	PRE	92	100	99	112	49
Dual + Bladex	1.5 + 1.0	PRE	72	97	99	93	49
Lasso + Bladex	2.0 + 1.0	PRE	78	99	98	100	49
Lasso + AAtrex	2.0 + 1.0	PRE	92	99	99	104	48
Lasso + Modown	2.0 + 1.25	PRE	37	93	94	96	50
Dual + Modown	1.5 + 1.25	PRE	43	96	98	95	46
Ramrod-atrazine	4.0	PRE	95	100	98	107	49
AAtrex + Crop Oil (1 qt/a)	1.5	POST	90	96	90	105	48
Buctril + 2,4-D, amine	.25 + .25	POST	95	98	90	101	48
2,4-D, amine + cultivation	.33	POST	82	95	88	109	49
Banvel + cultivation	.25	POST	88	99	88	105	49
Cultivation	---	----	73	90	92	99	49
Weedy check	---	----	40	43	50	87	49
LSD 0.05			19	8	6	11	ns
C.V. %			14	5	4	7	3

Planting date: June 19, 30-inch row spacing.

Hybrid: Garst 5511 (safened seed)

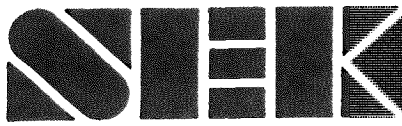
Herbicide treatments:

PPI (preplant incorporated with field cultivator)= May 22

PRE (after planting but before emergence)= June 20

POST (after emergence)= July 8 and July 15

Weed species: Weed competition was not great. Fair competition from morningglory (ivyleaf and tall) and smooth pigweed. Light competition from large crabgrass.



Comparisons of Selected Grain Sorghum, Soybean, and Sunflower Cultivars
when Doublecropped after Wheat

Kenneth Kelley

Summary

Three selected cultivars of grain sorghum, soybeans, and sunflowers were evaluated in a doublecrop study. Since the summer rainfall distribution was excellent during August and September, all three crops yielded very well. Grain sorghum averaged nearly 80 bu/a, soybeans nearly 30 bu/a, and sunflowers about 1500 lb/a.

Introduction

Doublecropping after wheat is a common practice in southeastern Kansas. Typically, soybeans are the major doublecrop; however, interest has been renewed recently in considering grain sorghum and sunflowers.

Experimental Procedure

In 1985, three selected cultivars each of grain sorghum, soybeans, and sunflowers were compared after wheat at the Columbus field. Land area was plowed, disced, and roller harrowed prior to planting on July 2.

Results

In 1985, rainfall during August and September was optimum, so all three crops yielded very well as shown in Table 32. Sunflowers averaged 1516 lb/a, soybeans 28.9 bu/a, and grain sorghum 78.9 bu/a.

The wetter than normal rainfall, however, caused a head rot to develop in the sunflowers later in the season. Head moths were not a serious problem when sunflowers were planted in July.

The early maturing grain sorghum hybrid did not yield as much as the medium maturing hybrids. However, with soybeans, the early and mid-maturing varieties (Williams 82 and Crawford) yielded significantly more than the later maturing Essex variety.

More yield data comparisons are needed over more varying climatic conditions to determine which crop is more suited for growing as a doublecrop in the climatic and soil conditions of southeastern Kansas.

Table 32. Comparisons of Selected Sunflower, Soybean, and Grain Sorghum Cultivars when Doublecropped after Wheat, Columbus Field - 1985.

Crop - Cultivar	Grain Yield	Test Wt.	Seed Wt.
<u>Sunflower</u>			
Interstate V711	1348	26	--
Cargill 207	1609	28	--
Cargill 205	1590	25	--
Avg.	(1516)		
<u>Soybean</u>			
Williams 82	30.1	--	16.4
Crawford	31.5	--	15.5
Essex	25.2	--	12.3
Avg.	(28.9)		
<u>Grain Sorghum</u>			
Garst 5715	64.4	57	--
Pioneer 8585	85.1	57	--
Stauffer 729	87.3	57	--
Avg.	(78.9)		

Planting date: July 2, 1985

Row Spacing: 30-inch

Tillage: Wheat stubble plowed, disced, and rolled.

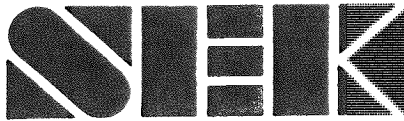
Fertilizer: Sunflowers and grain sorghum = 75 N - 35 P₂O₅ - 35 K₂O

Soybeans = 10 N - 35 P₂O₅ - 35 K₂O

Herbicide: Sunflowers: Lasso (1.5 qt/a) + Amiben-DF (2.4 lb/a)

Soybeans: Lasso (1.5 qt/a) + Lexone-DF (0.33 lb/a)

Grain Sorghum: AAtrex-L (1.5 qt/a)



Performance Testing of Small Grain Varieties

George V. Granade

Summary

Wheat and barley were planted in November, and spring oats, spring barley, and spring wheat were planted in March. All were harvested in late June or early July. Newer wheat varieties and hybrids seem to be well adapted to southeastern Kansas. However, disease resistant and yield potential are significantly different even among new releases. Schulyer, a barley developed in New York, continues to have good yield potential and straw strength. Ogle, a spring oat, has a high yield potential as well as good straw strength. Bates, also a spring oat, has a high yield potential, but does not appear to have such strong straw strength. The spring barleys have lower yields than the winter barleys, thus the potential of growing these in southeastern Kansas is not very promising. Yields of spring wheat were much lower than those of winter wheat. The potential at the present does not appear very promising for the spring wheats.

Introduction

The small grain variety tests are conducted to help southeastern Kansas growers select small grain varieties best adapted for the area. The small grains tested in 1985 included wheat, barley, spring oats, and two new tests, spring wheat and spring barley.

Procedure

There were 40 wheat varieties, five barley varieties, five spring oats, two spring wheats and five spring barley varieties grown in 1985. Wheat and barley were planted November 7, whereas the spring small grains were planted March 20. Seeding rates were 1,080,000 seeds per acre for both wheat types, 70 lb. per acre for both barley types, and 90 lb. per acre for the spring oats. Wheat and barley were fertilized with 100 lb. N per acre (in split application), 65 lb. P_2O_5 per acre, and 65 lb. K_2O per acre. The spring small grains were fertilized with 100 lb. N per acre, 65 lb. P_2O_5 per acre, and 65 lb. K_2O per acre.

Wheat Results

Average yield for all varieties tested was 46 bu. per acre. The spring of 1985 was mild and warm, which hastened wheat development and maturity. Yields of the more commonly grown varieties or hybrids are found in Table 33. More complete results for Kansas are compiled in Agric. Expt. Station Report of

Barley Results

Barley yields ranged from 45 to 60 bu per acre (Table 34). Lodging was very high for Dundy and Kanby, and was lowest for Schuyler.

Spring Oats Results

Yields and yield components of the spring oats may be found in Table 35. Average yield of the test was 54 bu. per acre, and test weights were 22 lb. per bushel. Yields of spring oats ranged from 45 to 58 bu. per acre, with Ogle being the highest yielding variety. Lodging was high for all varieties, with Ogle having the lowest percentage.

Spring Barley Results

Yields for the spring barley averaged 38 bu per acre (Table 36). Lud was the highest yielding variety and had the lowest lodging percentage. Morex also had a high yield but had a lodging problem. Lud and Otis are two-row barleys, while Bowers, Morex, and Robust are six-row barleys. Morex and Robust are malting barleys. These spring barleys have lower yields than the winter barleys, thus the potential of growing these in southeastern Kansas does not appear to be promising.

Spring Wheat Results

Yields and yield components for Guard and Olso can be found in Table 37. The spring wheat yields were approximately 50 percent of the average yield for the winter wheat.

Table 33. Wheat Variety Yields, Parsons, 1985

Brand	Variety or Hybrid	1985 Yield bu/a	1983-1984 Yield bu/a
AGC	103	48	--
Agripro	Mustang	48	42
Agripro	Victory	50	--
Agripro	Wrangler	45	51 [*]
-----	Arkan	48 [*]	55 [*]
Bounty	203	58 [*]	--
Bounty	205	53 [*]	--
Bounty	301	56 [*]	--
-----	Chisholm	50	--
Garst	HR-48	47	--
----	Newton	43	43 [*]
----	Payne	47	58 [*]
----	Pony	51	--
Pro Brand	830	50	55 [*]
Quantum	576	47	--
----	TAM 107	45	--
----	Caldwell	51	--
----	Compton	47	--
----	Hart	48	56 [*]
L.S.D.	.05	6.3	4.7

*Upper L.S.D. group. Differences among these values marked with asterisk are not statistically significant.

Table 34. Yield and Yield Components for Barley Varieties, Parsons, 1985

Variety	Yield Bu/a	Height In	Lodging %	Maturity ¹ Month day
Dundy	59.5	31	95	May 7
Hitchcock	55.5	33	60	May 10
Kanby	44.6	34	95	May 7
Post	55.3	34	67	May 9
Schuyler	60.1	30	52	May 13
L.S.D.	.05	ns	ns	31

Table 35. Spring Oats Yields and Yield Components

Variety	1985	Test	Lodging	Maturity	1983-1985
	Yield	Weight			Yield
	Bu/a	Lb/bu	%	Month day	Bu/a
Bates	57.1	24.2	88	May 22	88.8
Larry	51.2	21.4	95	May 19	79.3
Lang	45.0	20.9	92	May 20	80.9
Ogle	58.4	20.6	78	May 23	85.8
Webster	56.5	22.4	95	May 19	----
L.S.D. _{.05}	ns	1.7	7		

Table 36. Spring Barley Yields, Parsons, 1985

Variety	Yield	Test Weight	Lodging	Maturity
	Bu/a	Lb/bu	%	Month day
Bowers	39.5	31.0	92	May 23
Lud	40.8	36.8	54	May 26
Morex	39.2	30.8	89	May 20
Otis	33.8	34.5	92	May 19
Robust	36.5	34.1	81	May 21
L.S.D. _{.05}	ns	2.8	21	

Table 37. Spring Wheat Results for Parsons, 1985

Variety	Yield	Test Weight	Lodging	Maturity
	Bu/a	Lb/bu	%	Month day
Guard	20.3	46.0	22	May 27
Olso	22.8	47.4	5	May 20
L.S.D. _{.05}	ns	ns	14	



Corn Hybrid Performance Test

George V. Granade

Summary

A corn performance test was planted in Montgomery County under irrigation to determine how corn hybrids respond in southeastern Kansas. Several hybrids appear to have potential for southeastern Kansas with irrigation. However, this is the first year for this test and more results are needed to make any conclusions about which hybrids respond best to irrigation in the area.

Introduction

Some corn hybrids are grown in southeastern Kansas under irrigation. Determining which hybrids will perform best in southeastern Kansas is of prime importance to area farmers, who have irrigation facilities.

Procedures

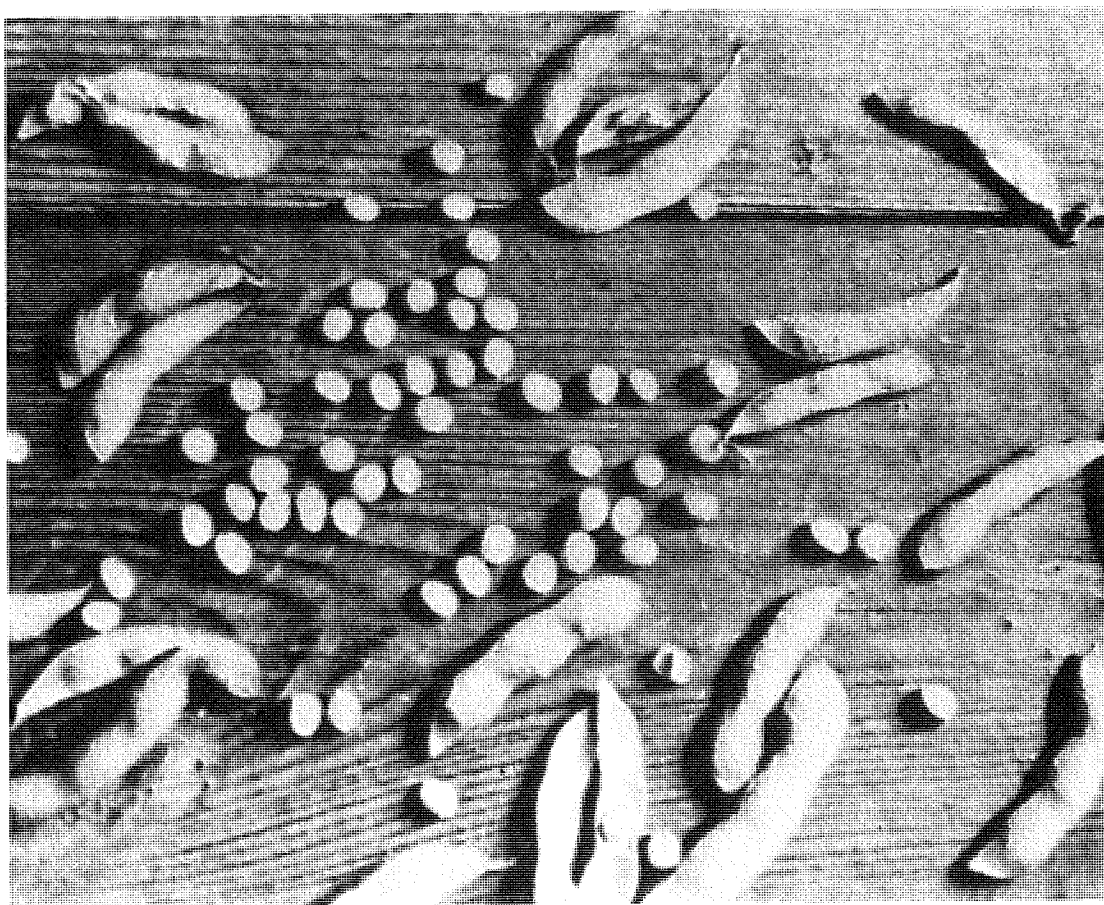
In 1985, 46 corn hybrids were planted in an off-station test under irrigation. The corn was planted on April 11 in 30-inch rows in Montgomery County.

Results

Moisture was adequate for most of the growing season; however, the corn was irrigated four times before harvest. Corn yields were probably reduced because of a hail storm in early June. The test averaged 133 bu per acre, with a range of 113 to 161 bu per acre. Table 38 shows the yields and yield components of some of the highest yielding hybrids. Complete results are compiled in Agric. Expt. Stn. Report of Progress 489.

Table 38. Corn Hybrids Yields, Montgomery County, 1985

Brand	Hybrid	Yield	Lodging	Silting		Weight
		Bu/A	%	Month	Day	Lb/Eu
Asgrow/O'S G	RX892	145	16	June	28	56
Bo-Jac	905	149	7	July	1	57
Funk's	G-4594	146	12	June	29	56
Funk's	G-4673A	161	43	June	29	55
Funk's/RA	RA-1505	147	48	July	2	52
Golden Acres	T-E 6996	158	30	July	1	56
Golden Acres	T-E 6998	150	14	July	2	55
Jaques	8400	154	22	July	1	57
Mcallister	SX7300B	143	15	June	29	57
Nebraska	715	156	20	July	1	54
Nebraska	714	151	73	July	1	53
Pioneer	3377	142	39	June	28	57
Pioneer	3183	154	55	July	1	56
SeedTec/WAC	915	145	35	June	29	57
Triumph	5120 Exp.	147	4	July	2	55



Soybean Variety Performance Test

George V. Granade

Summary

Soybeans from maturity groups III, IV, and V were planted in mid-June at the Columbus Field of the Southeast Kansas Branch Station. Weather conditions were very favorable for soybean growth during the growing season. Maturity group V soybeans varieties continue to show the most consistent high yields in southeastern Kansas. The early maturing soybeans resulted in high yields in 1985, but in past years have been very susceptible to charcoal rot and drought.

Introduction

Soybeans are an important crop to southeastern Kansas, which has about one-third of the state's acreage. Testing and developing varieties that are adapted to the area is of prime importance to area farmers.

Procedures

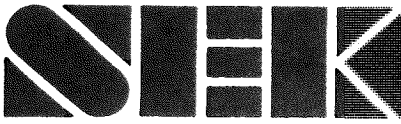
Maturity groups III, IV, and V were tested in 1985 at the Columbus Field of the Southeastern Kansas Branch Experiment Station. Soybeans were planted on June 18 in 30-inch rows.

Results

Moisture was good during most of the growing season, with high rainfall in August and a dry period during late July and late September. Yields were very good, with test averages of 35 plus bu. per acre. Some of the more commonly grown varieties are listed in Table 39. Complete variety results are compiled in Agric. Expt. Stn. Report of Progress 491.

Table 39. Soybean Cultivar Yields, Columbus Field

Brand	Variety	Maturity Group	1985	1984-85	1983-85
			Yield	Yield	Yield
			Bu/a	Bu/a	Bu/a
----	Pershing	V	45.0	29.4	----
DeKalb	CX482	IV	43.8	29.0	----
Ohlde	4386	IV	43.8	28.9	----
Jacques	J-130	IV	43.7	29.6	----
----	K1099	IV	43.4	24.9	----
Asgrow	A5149	V	43.3	----	----
Asgrow	A4595	IV	42.9	----	----
----	Essex	V	41.9	27.8	21.4
S-Brand	S-60H	III	41.6	----	----
----	Zane	III	41.2	----	28.8
----	Bay	V	40.9	26.8	23.4
----	Forrest	V	40.2	28.2	24.4
----	Douglas	IV	39.5	25.8	----
----	Sherman	III	38.7	----	----
----	Williams 82	III	38.6	25.6	----
----	Crawford	IV	37.8	25.9	----
----	Narow	V	36.3	26.0	----
----	Sparks	IV	35.4	24.4	----



Maturity Group V and VI Soybean Varieties

George V. Granade

Summary

Soybeans from maturity groups V and VI were obtained from private and public sources and planted in late May. Several maturity group V soybeans, which are not currently marketed in the area, have potential for southeastern Kansas. Maturity group VI soybeans do not have the yield potential of the group V soybeans.

Introduction

Many maturity group V soybean varieties are not currently grown in southeastern Kansas. Some private companies have not promoted group V soybeans in the area. The possibility also exists that maturity group VI soybean varieties might be grown.

Procedures

Soybeans varieties from maturity group V and VI were obtained from public and private breeders. These were planted at the Columbus field on 20 May in 30-inch rows with eight viable seeds per foot in a linear row (139,000 seeds per acre). Treflan at the rate of 2 pints per arce was incorporated before planting.

Results

Soybean yields ranged from 26 to 40 bu. per acre, with Bay having the highest yield (Table 40). The highest yielding group VI was Hartz 6130 with 34 bu. per acre. Two year averages ranged from 16 to 26 bu. per acre, with Bay having the highest yield (Table 40).

Table 40. Maturity Group V and VI Soybean Cultivars, Yield and Yield Components, Columbus, 1985

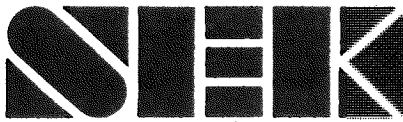
Brand-Variety	Maturity Group	1985 Yield Bu/a	Plant Height In	Maturity Mo-day	Seed per Pound	1984-85 Yield Bu/a
Bay	V	40.4	35	10-13	3178	25.9
Coker 425	V	39.1	23	10- 4	3380	23.8
Forrest	V	38.4	36	10-11	4154	24.6
Narrow	V	38.3	32	10- 9	4130	----
Coker 485	V	37.0	33	10-17	3595	----
Terra-Vig 515	V	37.8	34	10-16	3814	----
Hartz 5252	V	36.8	34	10-12	4001	----
Hartz 5370	V	36.7	35	10-15	4583	----
Coker 575	V	36.6	35	10-12	4406	----
Deltapine 105	V	36.4	35	10-14	3701	23.7
Hartz 5171	V	35.9	41	10-16	3856	----
Pershing	V	35.4	24	10- 4	4328	----
K-77-50-53 I	V	35.0	40	10- 7	3796	----
HB-EXF-141	V	34.3	36	10-15	4126	----
Yield King 563	V	34.3	37	10-12	3924	----
Hartz 6130	VI	34.0	39	10-19	4334	----
Wilstar 550	V	33.9	36	10-14	4556	----
Coker 156	VI	33.6	37	10-23	4567	20.7
Deltapine 345	V	33.2	36	10-16	4166	21.8
Yield King 593	VI	33.0	41	10-25	3602	----
RA 604	VI	32.9	43	10-24	3665	----
Yield King 503	V	32.6	41	10- 6	3960	----
Terra-Vig 505	V	32.5	37	10-15	4129	----
Essex	V	31.8	25	10- 4	4161	18.4
Bradley	VI	31.6	33	10-17	4492	19.2
RA 606	VI	31.0	42	10-25	3997	----
Shiloh	V	31.0	35	10-13	4214	----
Tracy M	VI	30.6	37	10-23	3381	17.7
RA 451	V	30.1	40	10- 7	3264	----
Deltapine 506	VI	28.7	41	10-27	3941	17.0
Terra-Vig 606	VI	28.3	39	10-26	4100	----
Terra-Vig 616	VI	27.5	38	10-26	4635	----
Davis	VI	27.1	39	10-23	3626	15.8
Yield King 613	VI	25.9	44	10-19	4158	----
Terra-Vig 553	VI	25.6	33	10-13	3567	----
L.S.D. .05		4.6	4		334	
Test mean		33.4	36		3985	
C.V. (%)		8.6	6.5		5.1	

Planted: May 20, 1985.

Herbicide: 2 pints/a of Treflan incorporated on May 20, 1985.

Fertilizer: 125 lb of 18-46-0/a; 125 lb of 0-0-46/a on April 19, 1985.

Soil test results: pH 6.5, P 36 lb/a, K 150 lb/a.



"Biosorb" Effects on Soybean Cultivars

George V. Granade

Summary

'Essex' and 'Narrow' soybean cultivars were planted with and without "Biosorb" in a growth chamber and at two different dates at the Columbus field. Root length in the growth chamber after 17 days indicated no significant differences. However, there was a slight trend for 'Essex' treated soybeans to have a lower root length than the untreated. 'Narrow' treated soybeans showed an increase in root length. Yields from the field indicated no significant differences between treatments regardless of planting date or cultivar because of "Biosorb" treatment.

Introduction

"Biosorb" is a compound with which seeds are coated to increase their potential for absorbing moisture from soil or air. This ability may help speed up germination in soils where moisture availability is becoming limiting.

Procedures

Growth Chamber

'Essex' and 'Narrow' soybeans were treated with the recommended rates of "Biosorb" and then planted in polyethene cylinders containing clay chips along with untreated seeds of each cultivar (one plant per cylinder). They were grown for 17 days and then harvested for measuring root length and dry root weight.

Field Work

Both cultivars were seeded at the rate of eight seeds per linear foot (139,000 plants per acre) at two planting dates, 18 June and 11 July. Plant height, maturity, and yield were measured.

Results

Growth Chamber

The growth chamber experiment indicated no significant differences with root length or dry root weight (Table 41). Although not statistically significant, 'Essex' soybeans tended to have a shorter root length with "Biosorb" than without, whereas 'Narrow' had increased root length with "Biosorb".

Field Work

There were no significant differences for plants per acre, plant height, yield, or number of seed per pound (Table 42). The first planting date of 'Essex' had a problem with spider mites, which reduced yields drastically. 'Essex' yields ranged from 9 to 20 bu. per acre, while 'Narrow' yields ranged from 17 to 28 bu. per acre.

Table 41. "Biosorb" Effects on Root Length and Mass in the Growth Chamber

Cultivar	Root Length		Dry Weight	
	Untreated	Treated	Untreated	Treated
	-----cm-----		-----grams-----	
Essex	501	441	0.205	0.153
Narrow	622	803	0.147	0.170

Table 42. "Biosorb" Effects on Yield Parameters for Two Planting Dates, Columbus, 1985

Cultivar	Plant Population per acre	Plant Height Inches	Yield Bu/a	Number of Seed per pound
June 18, 1985				
Essex	107,800	20.5	9.3	6270
Essex + "Biosorb"	113,600	20.2	9.8	6340
Narrow	73,700	20.0	26.1	4690
Narrow + "Biosorb"	78,000	25.0	27.8	4350
July 11, 1985				
Essex	105,500	20.8	19.5	4540
Essex + "Biosorb"	105,500	20.0	19.9	4500
Narrow	93,500	21.8	17.9	4600
Narrow + "Biosorb"	98,200	19.8	17.2	4630

Soybean Cultivar Response to Different Tillage Systems
in Southeastern Kansas¹

G.V. Granade, D.W. Sweeney, and W.T. Schapaugh²

Summary

Doublecrop soybeans are a common practice in southeastern Kansas. Soybeans are usually planted into one of three systems, a) burn wheat straw, disc; b) minimum tillage, i.e., double disc wheat straw; or c) no tillage. A study was initiated to determine which soybean cultivar would best fit each system. In 1985, the highest yields for Bay and Crawford were on the burn treatment. Highest yields for Sparks were on minimum tillage treatment and highest yields for Coker 393 and Williams 82 were on the no-tillage treatment.

Introduction

Doublecropping of soybeans in southeastern Kansas is a common practice, when time and soil moisture is available. Selection of the best cultivar is usually based on the results from the soybean performance report, which is for full-season soybeans. Several states have reported that the results from the performance report can be used for doublecrop systems; however, other states have indicated that there are differences. A study was initiated in 1984 to examine the response of soybean cultivars after wheat in three different tillage systems.

Procedures

Arkan wheat was planted in the fall of 1983 on a Parsons silt loam and harvested in late June, 1984. Soybeans then were planted into three tillage systems; (a) burn (burn wheat stubble, disc several times), (b) minimum tillage (disc twice with offset disc), and (c) no-tillage. Soybean cultivars used were Williams 82, Sparks, Essex, Narrow, Pershing, and K77-50-53. In 1984, 15- and 30-inch row spacings were used. The statistical design was a split-split plot with tillage systems as whole plots, row spacings as split plots, and cultivars as split-split plots.

Two changes for the 1985 growing season were to use only the 30-inch row spacings, while increasing soybean cultivars to 12. Soybean cultivars included the previous six, plus Coker 393, Zane, Crawford, Northrup King S42-40, Pioneer 9441 and Bay. The statistical design was a split plot with tillage systems as whole plots and cultivars as subplots.

¹ This research is supported by a grant from the Kansas Soybean Commission.

² Department of Agronomy, Kansas State University

Soybeans were planted at a target population of 139,000 plants per acre. Data collected were stand count, plant height, lodging, leaf area index (LAI), maturity, number of seeds per pound, and yield. Stand count was made 5 weeks after planting. LAI was determined at the R6 growth stage from a foot of border row. Number of seed per pound was determined by the conversion of 100-seed weight.

Results

In 1984, a drought in late July and August and an earlier than normal frost in September caused the crop to fail. Arkan wheat was planted in early November after the soybeans were disced under. Wheat was harvested in June 1985 from the previous years' doublecrop tillage area. Wheat yields were not significantly different, with yields averaging 30 bushels per acre.

Doublecrop tillage systems resulted in significantly different ($P < 0.05$) soybean population, lodging, LAI, and maturity in 1985 (Table 43). Plant population was higher on the burn and minimum tillage treatments than on the no-tillage treatment. This was expected because of the residue left by the wheat on the no-tillage system. Also, the burn plots may have had a warmer soil temperature than either of the other two systems. Lodging was lower with the burn than either of the other two systems; all scores indicated a very low level of lodging. LAI was highest with the minimum and no-tillage systems. Soybeans in the burn system matured 3 to 4 days earlier than in either of the other two systems. This may have been due to the earlier emergence of soybeans in the burn system.

A tillage by cultivar interaction was significant for the number of seeds per pound ($P < 0.05$) and yield ($P < 0.10$) (Table 44). Bay (in the burn system) and Sparks (in the minimum system) had the highest yield of 40 bushels per acre. In the no-tillage system, Pioneer 9441 had the highest yield of 38.4 bushels per acre. Coker 393 and Williams 82 had an increased yield on the no-tillage plot as compared to the burn plots. However, Crawford showed the opposite effect, with its highest yields on the burn plots and lowest on the no-tillage. Sparks' highest yields were with minimum tillage plots and lowest with the burn and no-tillage systems. Yields for the remaining eight cultivars were not significantly different for the different tillage systems. Bay (on the burn plots) had the largest seed size, whereas Pershing (on the no-tillage plots) had the smallest.

Table 43. Effect of Tillage Systems on Population, Lodging, LAI, and Maturity

System	Population	Lodging ¹	LAI ²	Maturity ³
	Plants/A			
Burn	96,980	1.36	2.994	283
Minimum	84,520	1.83	3.837	286
No-tillage	67,720	1.69	3.754	287
LSD.05	13,740	0.28	0.584	1

¹Lodging based on a 1 to 5 scale with 1=excellent, 5=poor.

²LAI - Leaf area index.

³Maturity based on Julian day.

Table 44. Seed per Pound and Yield for Soybean Cultivar by Tillage System

Soybean Cultivar	Tillage system					
	Burn		Minimum		No-tillage	
	Yield	Seed number	Yield	Seed number	Yield	Seed number
	Bu/a	/lb	Bu/a	/lb	Bu/a	/lb
Coker 393	31.8	3570	37.1	3240	38.1	3060
Williams 82	28.1	3160	34.3	2790	34.6	2830
Zane	30.6	2860	36.6	2760	32.5	2750
Crawford	37.0	2780	34.4	2810	30.3	2780
NK S42-40	35.6	3110	38.7	3200	37.5	3260
Pioneer 9441	34.1	3570	38.8	3170	38.4	3300
Sparks	29.9	3150	40.0	2840	29.8	2960
Bay	40.0	2730	34.1	2880	34.8	2850
Essex	29.4	3570	35.0	3830	33.4	3620
K77-50-53 I	31.7	2890	36.4	2910	36.1	2820
Narow	36.3	3770	34.3	3530	31.7	3530
Pershing	34.8	3800	34.0	3920	36.8	4090

LSD.05 for any comparison on seed number 290

LSD.10 for any comparison on yield 6.0



Relay Intercropping Soybeans into Wheat in Southeastern Kansas

George V. Granade

Summary

'Narrow' soybeans were either (a) broadcast with a cyclone seeder, (b) planted with a John Deere maximerge planter into Arkan wheat at the milk to early dough stage, or (c) doublecropped after wheat. Wheat yields were not significantly different when soybeans were either broadcast into wheat or doublecropped after wheat harvest; however, planting soybeans into wheat reduced wheat yields 56 percent. Soybean yields were significantly higher with a fallow May-planting than with either the broadcast-fallow or the broadcast-into-wheat. The Land Equivalent Ratio was significantly higher for the double-crop system than when a planter was used to plant soybeans into wheat (1.75 vs 1.07).

Introduction

Doublecropping in southeastern Kansas is risky because rains usually tend to diminish in late June and July, before the establishment of the soybean crop. Therefore, if soybeans could be planted earlier to establish a rooting system and aid early plant growth, some of the risk of making two crops in one season might be reduced.

Relay intercropping is a method where one crop is planted into another before the second crop is harvested. A study was initiated to examine three systems; (a) broadcast soybeans into wheat at the boot stage; (b) use a John Deere 7000 maximerge planter to plant soybeans into wheat at the boot stage; and (c) doublecrop system, i.e., plant soybeans in prepared ground after wheat harvest.

Procedures

This study was conducted at the Columbus field of the Southeast Kansas Branch Experiment Station on a Parsons silt loam. Arkan wheat was planted in early November, 1984 and harvested in late June, 1985. 'Narrow' soybeans treated with "Biosorb" (a material that may increase the seed's ability to absorb moisture) were planted into three systems as well as into fallow soil. The three systems were (a) broadcast (broadcast soybeans using a cyclone seeder into wheat at an early boot to bloom stage), (b) planter (plant soybeans using a John Deere 7000 maximerge planter on 30-inch rows into wheat at an early boot to bloom stage), and (c) doublecrop (harvest wheat, disc several times and plant soybeans using John Deere 7000 maximerge planter). Two fallow systems were planted, either by a cyclone seeder or the planter. Soybeans were broadcast at the rate of 90 pounds seeds per acre, and planted with the planter at

the rate of 35 pounds per acre (139,000 seeds per acre).

The Land Equivalent Ratio (LER) was calculated by using the following equation:

$$\text{LER} = \text{Sum of } I_i / M_i$$

where I_i is the intercrop yield of the i^{th} species (i.e., wheat or soybeans) and M_i is the monocrop yield of the i^{th} species.

Results

Wheat yields were significantly higher with the broadcast and doublecrop systems than with the planter system (Table 45). The planter system reduced wheat yields 56 percent. This may have been due to the late planting with the planter system; the wheat was in a late milk to an early dough stage when the soybeans were planted rather than in the earlier boot stage. The delayed planting was due to excessive rainfall. Test weights from the three systems were not significantly different, averaging 57 pounds per bushel (Table 45).

Soybean yield, maturity, and plant height were significantly different, whereas population, and number of seed per pound indicated no significant differences because of planting systems (Table 45). Soybean yield was highest with the fallow systems planted in either May or June, while the lowest yields were with broadcasting soybeans in wheat. Even though not statistically significant, the doublecrop system resulted in slightly higher yields than the planter-system. Soybean maturity was delayed by broadcasting soybeans or using a planter in wheat. Plant height was reduced by all three systems as compared to the fallow-planter system in either May or June. The fallow-broadcast soybean's plant height was also lower than that obtained with the fallow planter. Even though variation resulted in no significant differences for plant population, there was a trend for the broadcast-in-wheat to be higher than the other systems. The measured yield differences may be due in part to this wide variation in plant population. The number of seed per pound were not significantly different and the low coefficient of variation suggests minimal influence on soybean yield.

A yield advantage from intercropping, called "overyielding", occurs when the two or more crops in combination produce more than a monoculture of any single crop. The Land Equivalent Ratio (LER) is a common measure to determine if overyielding is occurring from growing more than one crop in a single season. The LER was significantly influenced by the different systems (Table 45). The doublecrop system had the highest LER of 1.75. Although not significantly different, the doublecrop system resulted in slightly higher production than the broadcast system. The planter system resulted in only slightly higher LER than the monoculture soybeans (i.e. planter-fallow), because of the poor wheat yield. The planter system's LER might be increased if the soybeans were planted at the boot growth stage of wheat instead of the milk to dough growth stage.

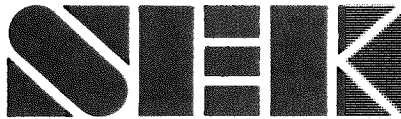
Table 45. Wheat and Soybean Yield Components for Relay-Intercrop and Doublecrop Systems

Soybean Planting System ¹	Wheat		Soybean					LER ²
	Yield Bu/a	Test Weight Lb/bu	Plant Population Plants/a	Maturity Month-day	Height In	Yield Bu/a	Number of Seed/pound	
Broadcast								
Fallow	----	----	158,030	10-14	24	19.6	3860	0.61
Wheat	38.6	57.5	251,680	10-17	18	15.0	3630	1.42
Planter								
Fallow	----	----	141,330	10-14	33	32.1	3770	1.00
Wheat	18.0	57.7	90,020	10-15	21	20.2	3760	1.07
Doublecrop	40.8	56.0	82,760	10-22	25	24.1	3850	1.75
Fallow, June	----	----	119,790	10-23	31	31.2	4020	0.97
LSD .05	10.7	ns ³	ns	1	4	12.4	ns	0.41
C.V. (%)	14.5	2.7	47.1	3.6	9.6	28.9	5.3	19.8
Test Mean	32.5	57.1	140,600	10-17	25	23.4	3820	1.14

¹Broadcast and planter were planted on 20 May and doublecrop and fallow June were planted on 20 June.

²LER -- Land Equivalent Ratio.

³ns -- not significant.



Phosphorus, Potassium, and Chloride Effects on Charcoal Rot
in Different Soybean Cultivars¹

G.V. Granade, C.A. Pearson, F.W. Schwenk², and W.T. Schapaugh³

Summary

Charcoal rot is a major disease problem with soybeans in southeastern Kansas, especially during hot, dry weather. Many fields in southeastern Kansas have soil P and K levels that are medium to low. A study was initiated to examine the effect of 11 fertility treatments on six soybean cultivars. Potassium decreased the rate of colonization of the fungus, whereas P and Cl increased the rate of colonization. The final colonization at harvest was the same for all treatments. Yields were increased by potassium, with 75 lb K₂O per acre giving the most economical yields. A phosphorus by cultivar interaction indicated that Sprite and Essex responded to 60 lb P₂O₅ per acre, whereas Bay, Desoto, and Harper responded to 120 lb P₂O₅ per acre. Even though not significantly different, chloride had a tendency to decrease yields compared to the no chloride plots.

Introduction

One-third of Kansas' soybeans are grown in the southeastern portion of the state. According to soil test results for 1980 and 1981, over half of the soils from southeastern Kansas were low to medium in K and 78 percent were low to medium in P. Charcoal rot is a major disease in southeastern Kansas, and recently has been estimated to reduce yields by as much as 50 percent in some fields. A study was initiated to determine whether phosphorus, potassium, or chloride levels individually or the phosphorus-potassium interaction could reduce the incidence of charcoal rot in different soybean cultivars.

Procedures

The experimental design was a split plot with a factorial arrangement of P, K, and Cl as whole plots and soybean cultivars as split plots with three replications. Rates of P were 0, 60, and 120 lb P₂O₅ per acre; K rates were 0, 75, and 150 lb K₂O per acre; and Cl rates were 0 and 118 lb Cl per acre. Phosphorus was applied as triple superphosphate; potassium was applied as muriate of potash, except for plots receiving K but not Cl where potassium sulfate was used; and Cl was applied as calicum chloride where K was not present. Six soybean cultivars from three maturity groups were used: Harper and Sprite (maturity group III), Desoto and Douglas (maturity group IV), and Bay and Essex (maturity group V).

¹ This research is supported by a grant from Phosphorus and Potash Institute.

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The experiment was conducted on a Parsons silt loam at the Parsons' field. This soil was in native vegetation until fall 1983, when it was chiseled, fertilized with 35 lb P_2O_5 per acre and 35 lb K_2O per acre, disced, and planted to soybeans the following spring. Soil samples were taken before fertilizing in May and again after harvest in November at two depths, 0 to 6 and 6 to 12 in. These samples were analyzed by the soil testing lab at Kansas State University. Fertilizer was broadcast by hand and incorporated on 22 May and soybeans were planted on 23 May. Six weeks after planting, 20 leaf samples were taken for N, P, and K analysis, and four root samples were taken to determine the amount of charcoal rot in the plants. Sampling was continued during the growing season at 3-week intervals until seed harvest. Plant height, seed per pound, and yield per acre were some of the yield components that were measured.

Results

Analysis of the May soil samples indicated that soil P was low (14 lb P/a), while soil K was in the medium range (156 lb K/a) (Tables 46 and 47). November soil samples indicated that soil P levels were in the low to medium range, while soil K levels varied in the medium range (Tables 46 and 47).

Fungus Effects

The fungus population in plants at harvest maturity, i.e., the final population, was not different at the three levels of K_2O tested. The data indicated that high levels of K_2O may delay early colonization but as plants approach maturity the colonization is more rapid; the end result is similar final populations for all levels of K.

Addition of 120 lb P_2O_5 per acre increased the average colonization rate from 0.108 to 0.142. Cultivars from maturity group III and IV all had enhanced rates of colonization when given increased levels of P, while colonization in Bay and Essex, group V cultivars, was not altered.

Chloride effects on charcoal rot also showed a significant positive relationship to colonization rate. Chloride intolerance in several cultivars may influence the colonization rate. Colonization in cultivars Desoto, Harper, and Sprite appeared to increase with the addition of 118 lb Cl pr acre, while rates were not altered in Bay, Douglas, or Essex.

Yield and Yield Components

A phosphorus-by-cultivar interaction was significant ($P < 0.05$) for plant height, yield per acre, and percent N in the plant at the R6 growth stage (Table 48). Bay and Douglas soybeans receiving 120 lb P_2O_5 per acre had increased plant height compared to the check Bay and Douglas, whereas the other soybean cultivars showed little change. Sprite and Essex soybeans showed a significant increase in yields at 60 lb P_2O_5 per acre over the checks, whereas Harper, Desoto, and Bay showed a significant increase with 120 lb P_2O_5 per acre. Percent N in Bay and Desoto increased as P_2O_5 increased; however, Harper increased from 0 to 60 lb P_2O_5 and then decreased. Main effects of P_2O_5 indicated an increase in the amount of N taken up from 0 to 120 lb P_2O_5 per acre (Table 49) at the R6 growth stage. Also, the amount of P taken up by the plant was higher with the 120 lb P_2O_5 than with 0 lb P_2O_5 (Table 49). Amount of K

taken up by the soybeans also increased ($P < 0.10$) as P_2O_5 rates increased (Table 49).

Soybean yields were increased 10 and 11 per cent with 75 and 150 lb K_2O per acre, respectively, compared to the control (Table 50). However, increasing from 75 to 150 lb K_2O per acre only increased yields 0.6 bu per acre. With 75 lb K_2O per acre, there were 2620 seeds per pound compared to 2700 seed per pound in the check plot (Table 50), indicating an increase in seed size. With the addition of another 75 lb K_2O per acre, the number of seeds per pound was reduced but not significantly over the 75 lb K_2O per acre treatment. The amount of K taken up by the plant at the R6 stage increased as the rate of K_2O increased (Table 18). A potassium-by-cultivar interaction was significant ($P < 0.05$) for plant height (Table 51). Bay and Essex soybeans showed an increase in plant height with 150 lb K_2O per acre. The other soybean cultivars did not show any significant differences in plant height.

Soybean yields, plant height, number of seed per pound, and uptake of K at the R6 growth stage are presented in Table 52. Even though the effect of Cl was not significant, there seems to be a trend for reduced yields and more seeds per pound with Cl than without Cl. Potassium-treated plots had higher yields than plots not receiving K. Desoto and Douglas were the highest yielding cultivars, whereas Harper had the lowest number of seeds per pound.

Table 46. Soil P and K Levels for Spring and Fall, 1985 for Phosphorus - Potassium Treatments

Fertilizer nutrients		Spring		Fall			
		0-6 in		0-6 in		6-12 in	
P_2O_5	K_2O	P	K	P	K	P	K
lb/a	lb/a	---lb/a---		---lb/a---		---lb/a---	
0	0	14	153	11	138	3	104
0	75	14	157	11	161	4	98
0	150	15	160	10	178	3	96
60	0	13	157	19	131	4	101
60	75	15	153	19	145	4	101
60	150	13	147	20	166	4	93
120	0	15	150	35	139	4	106
120	75	14	167	29	148	4	101
120	150	14	157	27	167	4	109
LSD(0.05)		ns	ns	ns	ns	ns	ns
Main Effects							
0		14	157	11	159	4	100
60		13	152	19	147	4	98
120		14	158	30	151	4	106
LSD(0.05)		ns	ns	3.2	8.9	ns	ns
	0	14	153	21	136	4	104
	75	14	159	20	151	4	100
	150	14	154	19	170	4	99
LSD(0.05)		ns	ns	ns	8.9	ns	ns

Table 47. Soil K and Cl Levels for Spring and Fall, 1985, for Potassium - Chloride Treatments

Fertilizer nutrients		Spring		Fall			
		0-6 in		0-6 in		6-12 in	
K2O	Cl	P	K	P	K	P	K
lb/a	lb/a	---lb/a---		---lb/a---		---lb/a---	
0	0	15	150	35	139	4	106
0	118	13	160	33	135	5	109
150	0	14	153	40	176	4	105
150	118	14	157	27	167	4	109
LSD(0.05)		ns	ns	ns	ns	ns	ns
Main Effects							
0		14	155	34	137	4	108
150		14	155	34	171	5	107
LSD(0.05)		ns	ns	ns	17	ns	ns
	0	14	152	37	157	5	106
	118	14	158	30	151	4	109
LSD(0.05)		ns	ns	ns	ns	ns	ns

Table 48. Soybean Yield, Plant Height, and Percent N as Influenced by Phosphorus and Cultivar Selection

P ₂ O ₅ lb/a	Soybean Cultivar					
	Harper	Sprite	Desoto	Douglas	Bay	Essex
Yield, Bu/a						
0	40.8	29.9	43.0	42.6	34.0	34.2
60	37.7	33.7	44.3	42.7	35.5	38.6
120	45.2	33.4	46.3	44.3	37.5	40.3
LSD(0.05, any comparison) 3.2						
Plant height, In						
0	23.7	15.3	29.6	28.2	31.6	23.4
60	22.4	16.4	30.2	29.2	32.7	24.9
120	23.2	15.6	31.8	30.6	34.0	24.9
LSD(0.05, any comparison) 1.5						
Percent N						
0	3.04	3.04	2.84	3.00	2.18	2.73
60	3.17	2.96	2.98	2.89	2.20	2.71
120	2.98	3.06	3.10	2.90	2.36	2.83
LSD(0.05, any comparison) 0.48						

Table 49. Phosphorus Effects on Plant Uptake of Nitrogen, Phosphorus, and Potassium at the R6 Stage

P2O5 lb/a	Plant Nutrient		
	Nitrogen lb/a	Phosphorus lb/a	Potassium lb/a
0	173.7	12.2	53.0
60	193.3	15.5	57.5
120	208.4	17.7	60.6
LSD(0.05)	16.4	1.4	ns
LSD(0.10)	---	---	5.8

Table 50. Potassium Effects on Yield per Acre, Number of Seeds per Pound, and Potassium Uptake

K2O Lb/a	Yield	Number of	Potassium
	Bu/a	seeds per pound	uptake Lb/a
0	36.6	2705	43.5
60	40.1	2622	58.4
120	40.7	2596	69.3
LSD(0.05)	2.0	34	7.1

Table 51. Potassium and Soybean Cultivar Influence on Plant Height

K2O lb/a	Soybean cultivar height, In					
	Harper	Sprite	Desoto	Douglas	Bay	Essex
0	23.9	15.4	30.9	29.7	32.1	23.9
60	22.8	16.4	30.8	29.2	32.3	23.7
120	22.7	15.4	29.9	33.8	33.8	25.7
LSD(0.05, any comparison) 1.5						

Table 52. Yield and Yield Components as Influenced by K, Cl, and Soybean Cultivars

Soybean cultivar	K ₂ O	Cl	Yield Bu/a	Plant height In	Number of seed per pound
	Lb/a	Lb/a			
Harper	0	0	41.6	23.7	1995
	0	118	34.8	23.3	2260
	150	0	46.6	23.7	1861
	150	118	46.4	23.0	1947
Sprite	0	0	28.6	15.7	2341
	0	118	30.2	15.3	2539
	150	0	37.7	16.0	2046
	150	118	34.8	15.0	2072
Desoto	0	0	43.4	32.0	2400
	0	118	39.3	31.3	2616
	150	0	53.3	32.3	2215
	150	118	48.4	31.7	2283
Douglas	0	0	41.4	31.3	2370
	0	118	40.8	28.7	2482
	150	0	53.0	28.7	2100
	150	118	46.2	30.3	2417
Bay	0	0	36.6	34.3	3073
	0	118	34.2	34.0	3104
	150	0	41.4	34.0	3041
	150	118	38.0	35.3	2979
Essex	0	0	37.7	24.0	3957
	0	118	34.4	24.3	3845
	150	0	44.6	26.0	3659
	150	118	42.5	26.3	3884
LSD(0.05)			ns	ns	ns
<u>Main Effects</u>					
		0	42.2	26.8	2588
		118	39.2	26.6	2702
LSD(0.05)			ns	ns	ns
		0	36.9	26.5	2749
		150	44.4	26.9	2542
LSD(0.05)			1.8	ns	ns
Harper			42.3	23.4	2016
Sprite			32.8	15.5	2250
Desoto			46.1	31.8	2379
Douglas			45.4	31.8	2342
Bay			37.6	34.4	3049
Essex			39.8	25.2	3836
LSD(0.05)			1.3	ns	36

Effect of Planting Date on Sunflower Varieties

George V. Granade

Summary

Southeastern Kansas has the potential to grow sunflowers. A study was initiated to examine the effect of planting dates on 10 sunflower varieties. Plant population was highest in May and decreased with the other planting dates. Yields ranged from 317 to 1160 pounds per acre over the three dates. Test weights varied from 26 to 34 pounds per bushel and oil content ranged from 41 to 49 percent.

Introduction

Interest in growing sunflowers in southeastern Kansas has increased. Sunflowers may be grown as a doublecrop after wheat. A study to examine the effect of planting date on sunflowers was initiated at the Columbus Field.

Procedures

Ten sunflower varieties from five companies were planted at three different planting dates (late May, mid-June, and early July) in four 30-inch rows with three replications. Plants from the last two planting dates were sprayed with an insecticide at the bud growth stage because a high number of insects was present after the May planting. Stand counts, yield, and test weight were recorded.

Results

Plant population, yield, test weight, and oil content are shown in Table 53. Plant population varied with planting dates, with the May planting having the highest and the next two plantings having decreased populations. Population for the June planting was low because of a heavy rain several days after planting, which may have caused some crusting, and the July planting was low because of rodents digging seeds up, and a dry period after planting. Yields were reduced for the May planting because of the head moth. Yields ranged from 317 pounds per acre to 1160 pounds per acre. Test weight varied with planting date, but ranged from 26 pounds per bushel to 34 pounds per bushel.

Table 53. Sunflower Yields and Yield Components by Planting Date, Columbus, 1985

Brand	Variety	May 22			June 18			July 11		
		Plant Population per acre	Yield Lb./a	Test Weight Lb./Bu.	Plant Population per acre	Yield Lb./a	Test Weight Lb./Bu.	Plant Population per acre	Yield Lb./a	Test Weight Lb./Bu.
Cargill	206	23,000	317	29.8	16,200	965	28.3	10,000	681	28.0
Cargill	208	23,400	609	33.0	18,000	1000	27.3	12,600	761	26.0
Interstate	7000	---	---	--	16,600	523	28.0	14,700	1093	25.7
Interstate	7111	---	---	--	17,400	660	28.7	7,500	631	26.3
PAG	101	24,500	465	29.0	14,300	946	28.8	7,300	695	29.8
PAG	103	21,600	513	33.7	13,300	633	29.0	10,400	657	26.7
Stauffer	303	20,500	676	32.0	16,800	789	27.7	9,300	761	25.7
Stauffer	1300	25,900	454	30.7	19,500	817	29.0	12,900	1160	28.0
Triumph	448	20,500	442	29.3	15,100	843	26.5	9,700	883	26.0
Triumph	566 DW	21,800	356	32.0	15,300	661	33.0	9,100	802	29.7

Herbicide: 2 pints/acre of Treflan incorporated on 20 May.

Fertilizer: 125 lb. 18-46-0/acre; 125 lb. 0-0-60/acre on 19 April.

Soil test results: pH 5.9, P 46 lb./a., K 190 lb./a.



Birdsfoot Trefoil Varieties in Southeastern Kansas

Joe L. Moyer

Summary

Nine birdsfoot trefoil cultivars were grown for 6 years and evaluated for 5. While little overall difference in yields was found, several varieties were more persistent than others.

Introduction

Birdsfoot trefoil is a widely adapted, non-bloating forage legume. One cultivar, 'Dawn', earlier showed good persistence and yield potential in eastern Kansas. Other varieties and cultivars are being tested in pure stands for adaptation and hay production in our environment.

Experimental Procedure

Plots established in spring, 1980 were maintained in 1985 with a fertilizer application of 40 lb P_2O_5 and 100 lb K_2O /acre on March 18. Plots were cut on May 22 and June 26, 1985 before the test was terminated.

Results

The first cutting in 1985 showed no yield difference among cultivars, but regrowth differences in the second cutting were highly significant ($P < .01$, Table 54). 'Fergus', 'Norcen', and the NC-83 germplasm pool produced significantly more second-cut forage than did 'Leo', 'Empire', and 'Dawn'. The latter variety also yielded significantly less than 'Carroll' and 'Mo-20'.

The most consistent varieties for 1981-83 production, 1984 stand rating, and total 5-year production were 'Fergus' and 'Mo-20'. 'Fergus' produced significantly more forage in 5 years than did 'Leo', a consistently poor performer, and its stand 4 years after seeding was rated significantly better than all varieties except 'Mo-20' and NC-83 pool (see Report of Progress 472).

Table 54. Birdsfoot Trefoil Forage Yields in 1985 and 5-year Totals, Mound Valley Unit, Southeast Kansas Experiment Station.

Variety	Forage Yield, tons/acre @ 12% moisture			
	5/22	6/26	1985 Total	5-Yr. Total
NC-83 Pool	2.58	1.95	4.53	20.76
Leo	2.47	1.51	3.99	19.25
Fergus	2.46	1.77	4.23	21.11
Carroll	2.50	1.66	4.16	19.70
Dawn	2.42	1.36	3.78	20.39
Mo-20	2.42	1.63	4.05	20.61
Empire	2.27	1.51	3.78	19.78
Viking	2.54	1.57	4.11	20.33
Norcen	2.63	1.76	4.39	20.12
LSD(.05)	N.S.	0.24	N.S.	1.30



Alfalfa Varieties in Southeastern Kansas

Joe L. Moyer

Summary

Alfalfa cultivars seeded in fall, 1982 were tested for 3 years before some stands declined. There was a 20% range in 3-year total yields.

Introduction

The importance of alfalfa as a feed crop and/or cash crop has increased in recent years. This study is to help producers decide which variety to select for their needs.

Experimental Procedure

The 20-line test was seeded in fall, 1982. Annual fertilization was applied March 18 at the rate of 40 lb P_2O_5 and 100 lb K_2O /acre. After evaluation of cultivars for degree of infestation and weevil damage, plots were sprayed April 19 with malathion. Plots were cut to determine forage yield on May 17 and June 26, then stands were rated August 7 before the test was terminated.

Results

Forage yields for 1985, 3-year total yields, weevil population and damage ratings, and final stand evaluation for the alfalfa test are shown in Table 55. Crabgrass invasion of plots having poor stands would have made third-cut yields meaningless. Total yield range was 20% of the average. Cultivar differences were found for weevil larval numbers and for damage rating, but the two factors did not always correspond. Stands of four cultivars were seriously thinned by spring heaving and the wet soils of early summer.

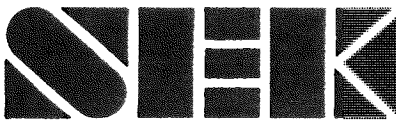
Table 55. Alfalfa Forage Production in 1985 and for 3 Years, Relative Weevil Larvae Population and Plant Damage Scores, and Final Stand Ratings.

Entry	Forage Yield			3-Year Total	Weevil Larvae ¹	Weevil Damage ²	Final Stand Rating ³
	1985		Total				
	5/17	6/26					
	- - -tons/a @12% moisture- - -						
Advantage	1.78	1.24	3.02	11.42	8.2	1.5	3.5
Armor	1.83	1.28	3.11	11.38	5.5	1.8	2.9
K81-10	1.84	0.93	2.77	11.28	8.2	1.2	1.5
Expo	1.71	1.22	2.93	11.19	7.2	1.5	3.2
120	1.95	1.08	3.03	11.18	8.8	1.5	2.1
532	1.67	0.99	2.66	10.98	7.8	1.5	1.1
K81-7	1.82	0.94	2.76	10.94	5.5	1.8	2.2
531	1.86	0.93	2.79	10.74	8.2	2.0	0.9
K80-11	1.88	0.92	2.80	10.64	8.5	1.5	1.1
WL 318	1.71	1.07	2.78	10.59	6.8	1.0	3.8
K80-17	1.74	0.97	2.71	10.52	9.5	2.5	2.1
130	1.66	1.01	2.67	10.51	5.0	1.2	1.4
K81-17	1.68	0.83	2.51	10.43	8.0	2.2	1.2
Pike	1.80	0.88	2.68	10.30	8.2	1.5	1.2
Raidor	1.75	0.79	2.54	10.29	8.5	1.8	0.5
555	1.68	1.00	2.68	10.21	9.5	1.5	1.5
Riley	1.59	0.75	2.34	10.17	7.0	1.0	0.5
Kanza	1.53	0.74	2.27	9.75	8.0	2.2	0.6
Sou. Special	1.57	1.06	2.63	9.72	8.0	2.0	2.5
LSD(.05)	0.24	0.19	0.32	0.80	3.2	1.0	0.7

1 Relative weevil larvae infestation, where 10 = greatest density

2 Relative damage rating, where 0 = no damage and 3 = maximum stem terminal damage

3 Stand rating, where 5 = "perfect" stand and 0 = no alfalfa plants in plot.



Effects of Fertilization and Spring Weed Control on Bermudagrass Yields

Joe L. Moyer

Summary

Split N application in previous years gave best yields, whereas 100 lb/acre K_2O produced no more forage than the 50-lb rate. July production was slightly better after spring burning than after paraquat use.

Introduction

Bermudagrass can be a valuable high-input, high-production summer forage. The main input, N, can sometimes be used more efficiently with split than with single applications. Potash has been associated with winter hardiness in some locations. High fertility programs can encourage cool-season weeds in bermudagrass, but controlling such weeds may not be economical, and burning could be directly or indirectly harmful to bermudagrass.

Experimental Procedure

Plots established in 1981 were treated similarly in 1985 with rates listed in Table 56, plus 50 lb P_2O_5 /acre. Only one fertilizer application was made, on June 24, and yields were measured from one cutting on July 29. Spring burning was performed on one of two sets of subplots April 8, and paraquat (1 qt/a + .5 pt X-77/100 gal) was sprayed on the other set of subplots on April 9.

Results

Yields were as high when a variable 200-lb N rate was spring-applied in a split-rate regimen, as when 450 lb N/acre was applied each year in a single spring application (Table 56). Yields were also as high or higher with the 50-lb as the 100-lb K_2O /acre rate. Spring-burned plots yielded slightly more than did paraquat-treated plots, despite an observed delay in early growth of the spring-burned plots.

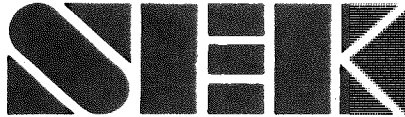
Table 56. Effect of N Fertility Rate and Timing, K Rate, and Spring Weed Control Method on Bermudagrass Forage Yield.

<u>Treatment</u>	<u>Forage Yield¹</u>
<u>N Rate (lb/a)</u>	
Control	0.55
150	1.49
300	1.76
450	2.10
150 + 100/cut ²	1.95
150 + Variable	1.60
Variable ³ + 100/cut	2.08
LSD(.05)	0.33
<u>K Rate (lb/a)</u>	
50	1.72
100	1.57
LSD(.05)	0.14
<u>Weed Control Method</u>	
Paraquat	1.60
Spring burning	1.69
LSD(.05)	0.09

¹ Tons/acre at 12% moisture.

² No post-cutting N applications were made in 1985.

³ Initial spring application rate was 200 lb/acre.



Forage Yields of Tall Fescue Varieties in Southeastern Kansas

Joe L. Moyer

Summary

The standard variety, 'Ky 31', had the highest 3-year production in the test, significantly better than 5 of the other 10 entries.

Introduction

Tall fescue is the most widely grown forage grass in southeastern Kansas. New cultivars with possible advantages were tested for agronomic adaptation to the area.

Experimental Procedure

Plots seeded in fall, 1981 were fertilized with 80-40-40 lb/acre of N-P₂O₅-K₀ on March 19. Plots were harvested for yield determination on May 20.

Results

There were no significant differences in 1985 forage yields among tall fescue varieties (Table 57). Three-year yields showed 'Ky 31', 'Mo-96', and 'K5-30' to be the three highest-yielding available cultivars, each of which produced significantly more than 'Kenhy'. 'Ky 31' produced significantly more forage over the 3-year period than did five other entries, including three newly released varieties.

Table 57. Forage Yields of Tall Fescue Cultivars in 1985, and 3-year Total Production, Mound Valley Unit, Southeast Kansas Experiment Station.

Entry	Source	Forage Yield	
		1985	3-Yr Total
		- tons/a @ 12% moisture -	
Kenhy	Univ. Kentucky	2.29	8.72
K5-30	Northrup-King	2.42	10.02
Johnstone	Univ. Kentucky	2.52	9.39
WG 3B	Univ. Missouri	2.63	9.38
Mozark	Univ. Missouri	2.26	9.14
Ky 31	Common	2.60	10.39
H 1	Univ. Missouri	2.49	10.02
Forager	FFR	2.72	9.65
LMR	Univ. Missouri	2.65	9.80
Mo-96	Univ. Missouri	2.46	10.03
Martin	Univ. Missouri	2.41	9.42
HMR	Univ. Missouri	2.49	10.12
LSD(.05)		N.S.	0.91

Effect of Fertilizer Placement on Tall Fescue Forage Yield and Quality

J. L. Moyer and D. W. Sweeney

Summary

Two experiments were performed to determine how amount and placement of fertilizer nutrients affect their use. In the first, knifing UAN at 4" depth often increased forage yield and N uptake compared to broadcast, dribble, and deeper placement, but knifing at 2" caused more apparent N losses than all other treatments. The second experiment showed occasional responses of other fertilizers with N, and some gain in yield response to N with spring-fall split applications.

Introduction

Most of the pastures in southeastern Kansas contain long-term tall fescue, which has been continually fertilized by topdressing. This practice can result in low soil fertility beneath a narrow surface zone, poor uptake during periods of adverse soil conditions, and greater susceptibility to N tie-up and loss.

Two experiments were performed to determine how tall fescue forage yield, quality, and N use were affected by (1) depth and method of UAN placement at 2-, 4-, and 6-inch depths of subsurface band placement ("knifed"), as well as surface broadcasting and banding ("dribble"), (2) N rates when using broadcast, dribble, or knifed N application methods, (3) single or split application of N, and (4) supplemental fertilization with P, K, S, B, and Zn with UAN applied by broadcast, dribble, or knifed methods.

Experimental Procedures

Experiment I

The first two objectives were addressed by using a UAN applicator to apply broadcast, dribble, or one of three knife depths, with 0, 75, or 150 lb N/acre on March 26, 1985. Uniform applications of 39 lb P₂O₅/acre and 77 lb K₂O/acre were made to all plots March 25.

Forage samples were clipped on April 15 for estimation of N uptake, and total forage production was harvested May 15, with subsampling to determine yield and quality. Kjeldahl N analysis was performed on all forage samples, and soil was sampled for N analyses at 2.5-, 5-, and 7.5-inch depths before treatment and at each harvest.

Experiment II

Two off-station locations were chosen in 1984 to study objectives three and four, primarily, and one of these was used in 1985. The experimental treatments are summarized in Table 60. Initial application of 150 lb N/acre as UAN by broadcast, dribble, or 4-inch knife methods was made on March 26,

1985. At the same time, some treatments received 40 lb P₂O₅/acre from liquid 10-34-0 with the UAN, other plots also received 40 lb K₂O/acre from 3-10-10, and 12-0-0-26, sodium borate, and 10% Zn chelate were used to provide a 150-40-40-30-2B-1Zn lb/acre analysis to yet another set of plots (Table 60). Check plots received each treatment except for N, or no treatment.

Plots for split N applications received a 100-40-40-30-2B-1Zn lb/acre analysis fertilization on March 26. Fall applications of 50 lb N/acre as UAN by each method were made September 5.

Forage produced after the first fertilization was harvested on April 24 and May 16, with subsampling as in Experiment I. Soil was sampled to an 8-inch depth before treatment and at harvest for N analyses. Fall fescue production was harvested December 26, 1985.

Results

Experiment I

Estimates of early fescue forage production taken in 1984 and 1985 indicated a response to fertilization with 75 lb N/acre, but no further increase at the 150-lb rate (Table 58). Increasing the N rate from 75 to 150 lb/a resulted in a significant increase in final spring forage yield only in 1985. No differences because of N rate were measured in 1983 or 1984. However, even though significant, the increase in yield in 1985 was less than 0.5 tons/a. Subsurface applications of UAN generally resulted in lower early forage production than surface application methods. However, where UAN was knifed at 4 inches, final yields were either equal to or higher than yields resulting from other application methods. Although only the 1985 harvest indicated a significant effect on yields from interaction between N rate and placement, knife application of UAN at 2 inches at the 75 lb/a N rate resulted in lower fescue yields.

Nitrogen uptake at intermediate and final harvests is shown in Table 59. Except for 1983, increasing N rate from 75 to 150 lb/a produced higher nitrogen uptake values. In general, these increases in N uptake were not as large as those between the checks and the 75 lb N/a rate. Fertilization with 75 lb N/a resulted in approximately a twofold increase in N uptake above the checks, whereas further increases from 75 to 150 lb N/a resulted in less than 60% additional N uptake. Deep placement of the UAN generally resulted in lower N uptake early in the spring than from surface applications. However, by harvest in both 1984 and 1985, N uptake in the forage was highest where the UAN was knifed at 4 inches. No significant differences between the other placement methods were found for N uptake. The intermediate and final harvests in 1984 as well as the final harvest in 1985 showed the same interaction as indicated for the 1985 yield. This resulted from N uptake by fescue being lower where 75 lb N/a as UAN was knifed at 2 inches.

Experiment II

Fescue yield results are summarized in Table 61. Yields at both locations as well as from both years responded to N as compared to yields obtained from the no fertilization checks or the treatments receiving P, K, S, B, Zn but no N. Although the increases were not usually significant, a gradual increase in yield was measured as additional nutrients were included in the treatment. The addition of supplemental nutrients did not significantly increase yields above N alone at Location 1 in 1984. However, the addition of all nutrients resulted in 0.55 t/a increase over N-only at Location 2 in 1984. At the intermediate sampling at Location 2 in 1985, the

Table 58. Fescue Yield as Affected by N Rate and Placement.

Treatment Means	Forage Yield @ 12% Moisture, tons/A				
	1983	1984		1985	
	Final	Int.	Final	Int.	Final
<u>N Rate (lb/a)</u>					
75	3.16	0.89	2.35	0.95	2.20
150	2.98	0.91	2.52	1.03	2.68
F Value	NS	NS	NS	NS	*
<u>N Placement</u>					
Broadcast	3.14	0.96	2.32	1.18	2.64
Dribble	3.14	1.05	2.61	1.16	2.44
Knife - 2"	2.89	0.75	2.01	0.99	2.20
Knife - 4"	3.22	0.91	2.77	0.95	2.63
Knife - 6"	2.95	0.81	2.42	0.69	2.29
LSD (0.05)	NS	NS	0.44	0.25	0.29
<u>Rate by Placement</u>					
F Value	NS	NS	NS	NS	*
Avg. of checks	2.19	0.61	1.46	0.55	1.09
* P<0.05					

Table 59. Nitrogen Uptake by Fescue as Affected by N Rate and Placement.

Treatment Means	N Uptake in Forage, lb/A				
	1983	1984		1985	
	Final	Int.	Final	Int.	Final
<u>N Rate (lb/a)</u>					
75	85.7	36.2	57.8	46.2	59.4
150	86.7	44.8	80.1	59.4	93.6
F Value	NS	*	*	*	*
<u>N Placement</u>					
Broadcast	84.0	41.5	63.0	60.0	67.7
Dribble	80.6	52.5	70.9	63.6	71.3
Knife - 2"	71.8	35.9	59.1	54.5	69.0
Knife - 4"	100.7	41.8	90.0	50.4	98.2
Knife - 6"	94.1	30.6	61.6	35.7	76.3
LSD (0.05)	NS	11.5	15.8	14.5	12.0
<u>Rate by Placement</u>					
F Value	NS	*	*	*	*
Avg. of checks	49.5	16.9	30.0	19.4	23.6
* P<0.05					

Table 60. Description of Fertilization and Placement Treatment Variables

Fertilization Treatment	Fertilizer, lb/A						
	N		P ₂ O ₅	K ₂ O	S	B	Zn
	Spring	Fall					
N	150	-	-	-	-	-	-
N, P	150	-	40	-	-	-	-
N, P, K	150	-	40	40	-	-	-
N, P, K, S, B, Zn	150	-	40	40	30	2	1
N / N, P, K, S, B, Zn	100	50	40	40	30	2	1
P, K, S, B, Zn	-	-	40	40	30	2	1
Check	-	-	-	-	-	-	-

Fertilizer Placement	Depth		Spacing
	1984	1985	
	inches		
Broadcast	-	-	-
Dribble	-	-	10
Knife	6	4	10

Table 61. Mean Values of Fertilization and Placement Method Effects on Fescue Forage Yield

Treatment Means	Forage Yield @ 12% Moisture, tons/A			
	1984		1985	
	Location 1	Location 2	Int.	Final
	Final	Final	Int.	Final
<u>Fertilization</u>				
N	2.55	3.69	1.21	2.52
N, P	2.44	3.79	1.38	2.69
N, P, K	2.66	3.79	1.38	2.81
N, P, K, S, B, Zn	2.73	4.24	1.46	2.83
N / N, P, K, S, B, Zn	2.80	3.84	1.34	3.21
P, K, S, B, Zn	1.95	1.94	0.57	1.17
LSD (0.05)	0.33	0.46	0.26	0.34
<u>Placement</u>				
Broadcast	2.56	3.41	1.32	2.47
Dribble	2.66	3.71	1.42	2.49
Knife	2.35	3.53	0.94	2.61
LSD (0.05)	0.23	NS	0.18	NS
<u>Fert. by Place.</u>				
F Value	NS	NS	NS	NS
Check	1.56	1.45	0.72	0.69

addition of nitrogen increased yields above treatments receiving no nitrogen, but the addition of P,K,S,B,Zn did not result in any increase in intermediate yields. Final spring yields in 1985 at Location 2 followed a similar trend, except that the split N application resulted in higher yield than that obtained when all fertilizer was applied in early spring. This may be because the first fall application of N to the split treatment was in 1984. Thus, in spring 1984 at both locations in plots that were to receive split N applications, only 100 lb N/a had been applied prior to the harvest date. Therefore, the 1985 data suggest a possible yield advantage to split N applications. At Location 1 in 1984, dribble application resulted in higher yield than knifing the nutrients at 6 inches. Though not significant, the same trend was noted at Location 2 in 1984. Since the knife method was at 4 inches at Location 2 in 1985, yields were slightly higher than with the dribble or broadcast methods, even though there were no statistical differences between methods. The intermediate yield results in 1985 suggest that early in the spring, the root system of fescue may utilize the surface-applied nutrients more efficiently, but by final harvest, knifing at 4 inches is equivalent to the surface application methods.

Total forage N-uptake responses were similar to yield responses at Location 1 in 1984 (Table 62). Responses of N uptake were more affected at Location 2 than Location 1 in 1984 by both fertilization and placement treatments with no interaction between the two factors. Besides the obvious response to N fertilization, variable responses of N uptake to the addition of P, K, and micronutrients with N were observed. Application of all nutrients in the spring at Location 2 resulted in higher N uptake than any other fertilization scheme including split N application, except for the N and P combination. In 1985 at Location 2, nitrogen uptake in the final yield indicated higher N uptake when P,K or P,K,S,B,Zn were included with N application than with N only. Only at Location 1 in 1984 was final N uptake not affected by fertilizer placement method. Nitrogen uptake at the intermediate sampling at Location 2 in 1985 suggested that early fescue utilization of fertilizer N is lower with subsurface than surface applications. However, final N uptake at Location 2 was higher with knifing than broadcasting in both years, and dribble resulted in intermediate N uptake.

Table 62. Mean Values of Fertilization and Placement Method Effects on Nitrogen Uptake by Fescue.

Treatment Means	N Uptake in Forage, lb/A			
	1984		1985	
	Location 1	Location 2	Location 2	Location 2
	Final	Final	Int.	Final
<u>Fertilization</u>				
N	67.7	87.6	58.6	85.5
N, P	63.8	101.4	73.2	93.8
N, P, K	71.9	89.9	73.7	105.5
N, P, K, S, B, Zn	74.8	108.7	76.4	102.9
N / N, P, K, S, B, Zn	66.3	90.8	62.4	98.8
P, K, S, B, Zn	39.9	39.3	19.1	32.6
LSD (0.05)	9.8	16.5	13.1	15.1
<u>Placement</u>				
Broadcast	63.6	74.0	60.0	77.7
Dribble	65.7	89.3	70.5	86.6
Knife	62.9	95.6	51.7	94.0
LSD (0.05)	NS	11.7	9.3	10.6
Check	31.3	25.9	22.7	18.9



Effect of Treating Tall Fescue Pasture with Mefluidide on
Forage Quality and Grazing Steer Performance

L. W. Lomas and J. L. Moyer

Summary

April treatment of two pastures with mefluidide produced a slight overall improvement in fescue crude protein content and leaf:stem ratio occasionally affected forage P content, but not animal gains nor endophytic fungus level when compared to two untreated pastures.

Introduction

Mefluidide is a plant growth regulator that inhibits seed stalk development and maintains the vegetative status of tall fescue, when treatment is made in the jointing stage. Although treatment may inhibit total dry matter production, growth that occurs is generally of higher grazing quality than grass that is allowed to "go to seed". This research was conducted to assess the plant and animal response, and the increase in animal production obtained from treatment.

Experimental Procedure

Four 5-acre Kentucky 31 fescue pastures were topdressed with 80-40-40 lb of N-P₂O₅-K₂O fertilizer per acre on January 23, and 46 lb N/acre on August 26, 1985. Application of 0.25 lb a.i./acre (1 pt Embark 2-S^(R)) was made with 30 gal/acre of water containing 1 pt/100 gal of X-77 surfactant on April 4.

Thirty-two Angus x Hereford steers were allotted among the four pastures (8/pasture). Grazing was initiated on control pastures April 4 after all steers were implanted with Synovex-S^(R) and dewormed with Tramisol^(R). Steers assigned to treated pastures were grazed on smooth brome grass during the 14-day grazing restriction, then reweighed and turned onto treated pastures April 18. Steers received 150 mg Rumensin^(R) in 2 lb rolled corn/head daily, and were reimplanted with Synovex-S^(R) August 15. Animals were weighed after each 28-day period, and initial and final weights followed a 16-hr shrink without feed and water. The study concluded on November 14, 1985.

Grab samples of forage were taken from each pasture near each animal weigh date, and between dates during the summer months for analysis of forage crude protein and P content. Disk meter readings (10, on 20-ft intervals) were taken on June 3 to estimate grazing intensity and uniformity. Forage was cut from exclosures June 28 for estimates of total production and leaf:stem ratio.

Results

Crude protein content of pasture forage was significantly ($P < .05$) greater over the grazing period in treated than control pastures (12.3 vs.

10.6%). Seasonal trends were similar for both sets of pastures, except for the last sampling when protein in treated pastures increased relative to the control (Figure 1).

Forage P content was affected differently by treatment at different dates, but there was no net overall treatment effect (Table 63). Leaf:stem ratio averaged 0.78 and 1.76 on control and treated plots, respectively, but with the pasture variability experienced, more intensive sampling would have been required to show a significant difference. Pasture variation in leaf:stem ratio was partly because of poorer seedhead suppression in 1985 (80-90%) than in the same treated pastures in 1984. Residual forage on June 3 did not differ by treatment, averaging 2300 and 2900 lb dry matter/acre for control and treated pastures, respectively. Homogeneous variances between treatments indicated that grazing uniformity was similar for both treatments.

FIGURE 1. EFFECT OF MEFLUIDIDE ON FESCUE PROTEIN

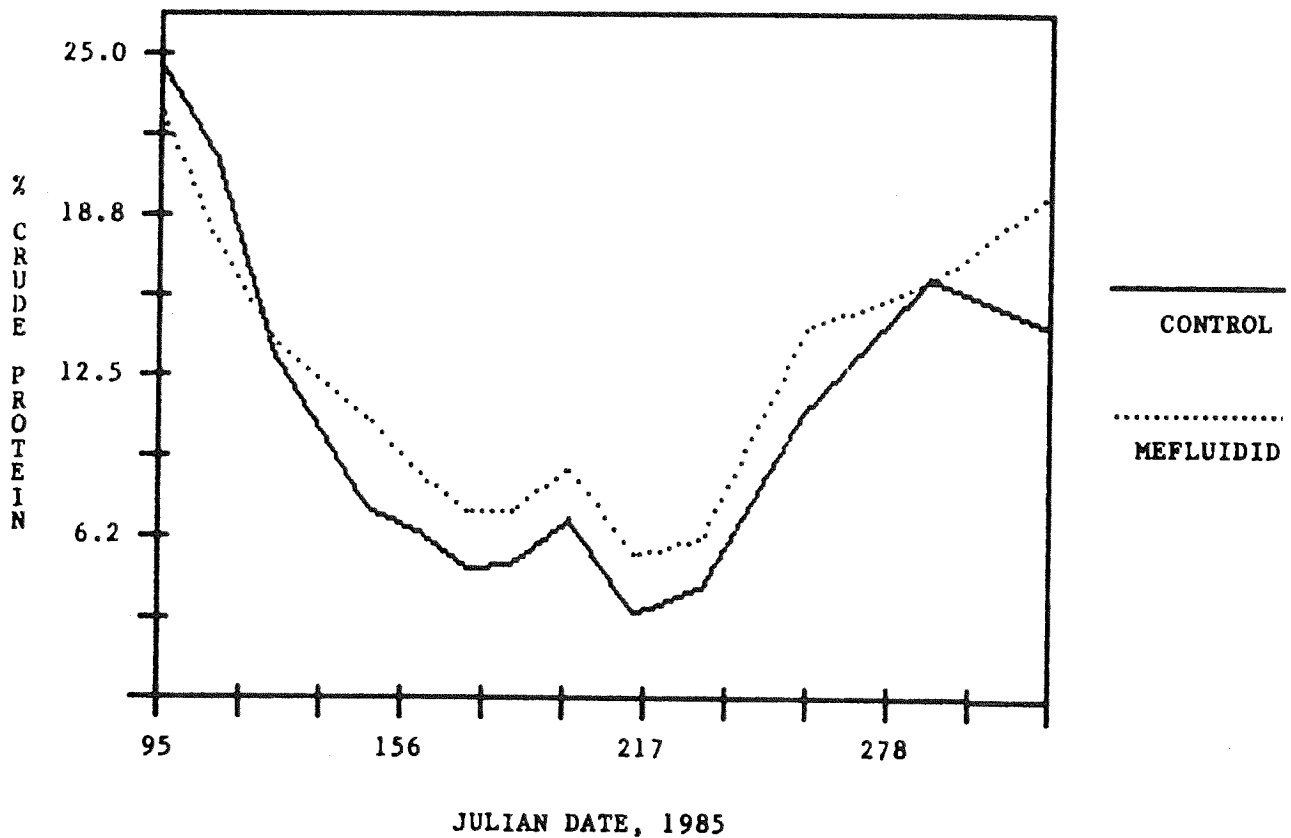


Table 63. Forage P Contents from Control and Mefluidide-treated Pastures during the Grazing Period.

Date	Forage Phosphorus	
	Control	Mefluidide
April 5	0.40	0.40
April 19	0.41	0.32
May 3	0.35	0.36
May 25	0.28	0.30
June 6	0.25	0.30
June 17	0.22	0.25
July 11	0.31	0.31
July 26	0.14	0.25
August 12	0.29	0.22
September 5	0.31	0.38
October 3	0.36	0.34
October 31	0.30	0.40
	LSD(.05)	0.08

Results of steer performance are listed in Table 64. Steers grazing mefluidide-treated pastures gained 10.4% more (0.13 lb/hd daily) than those grazing untreated pastures. Pastures treated with mefluidide produced 14 lb more liveweight gain per acre than controls. Gains in both treatments were less in 1985 than 1984 (Report of Progress 472), and the response differential between treatments was smaller, so that gross returns did not quite cover cost of the material.

Table 64. Effect of Mefluidide on 1985 Grazing Steer Performance.

Item	Control	Mefluidide
No. of Steers	16	16
Initial wt., lb	449	456
Final wt., lb	730	746
Total gain/steer, lb	281	290
Days on experiment	224	210
Average daily gain, lb	1.25 ^a	1.38 ^a
Stocking rate, steers/acre	1.6	1.6
Liveweight gain, lb/acre	450	464

^a Means with the same superscript do not differ significantly (P>.05).

Fall-applied Low-Volume Herbicides for Eliminating Endophyte-infested Fescue

Joe L. Moyer

Summary

Several postemergent herbicides were used at two or more rates in 9 gal/acre on November 7, 1984, and control was evaluated on May 10, 1985. Glyphosate and paraquat were each effective in eliminating fescue, with acceptable control (97% or more) obtained with 1 pt and 1 qt/acre rates, respectively.

Introduction

An endophytic fungus in tall fescue has been associated with poor performance in livestock. The fungus exists only in the asexual form in tall fescue; is found in crowns, sheaths, stems, and seed; and appears to be transmitted only as a seed-borne organism. The only method of elimination known at present is destruction of the infested host plant. The establishment of endophyte-free fescue stands must now be preceded by elimination of endophyte-infested plants. This study tested effectiveness of several postemergent, grass-control herbicides in a fall application at rates that might be considered economically feasible.

Experimental Procedure

Flat-fan nozzles (Tee-Jet^(R) 8001) were used at 40 p.s.i. to apply about 9 gal/acre of total material to sprayed plots, and a wick application of 2:1 water:glyphosate was used on established tall fescue. Rates and surfactants used were those listed in Table 65, on three replications of 25'x 8' plots on November 7, 1984. A split-application treatment of paraquat was included, and the spring follow-up application was on April 9, 1985. Fescue plant kill was assessed on May 10, 1985 as percentage of dead plants in the total established plant population.

Results

Treatments and control percentages are shown in Table 65. Glyphosate at 2 qt and 1 qt/acre killed all fescue plants in the sprayed 6' strip. The 1 pt/acre rate of glyphosate was also very effective, but control by the wick method was spotty because of the difficulty of obtaining uniform application on the short-statured fall vegetation. Paraquat effectively eliminated established fescue plants at the 1-qt rate, but the 1 pt/acre rate was not as effective. The split fall-spring application of 1/2 pt + 1/2 pt was not effective, killing only two-thirds of the established plants.

Other herbicides in the trial (not labelled for use on fescue) were much less effective at rates used. Sethoxydin and haloxyfop had some activity on established fescue plants, but pronamide, diuron, fluazifop, and DPX-Y6202 had little effect (see Table 65 with trade names).

Table 65. Herbicides and Rates Used in Low-volume Fall Applications, and Their Effect on Plants in an Established Tall Fescue Stand.

Chemical	Herbicide Name	Rate/acre		Fescue Kill
	Trade	Product	Formulation	
Glyphosate	Roundup	2 qt	3-S	- % - 100
		1 qt		100
		1 pt		98
		Wick		83
Paraquat ¹	Paraquat	1 qt	2-S	97
		1 pt		88
		1 pt ²		67
Pronamide ³	Kerb	1.0 lb	50WP	8
Diuron ³	Karmex	1.25 lb	80WP	0
Sethoxydin ⁴	Poast	1.0 pt	1.53 EC	87
		0.5 pt		40
Fluazifop ⁴	Fusilade	0.5 pt	4 EC	40
		0.25 pt		17
Haloxyfop ⁴	Verdict	0.5 pt	2 EC	87
		0.25 pt		55
DPX-Y6202 ⁴	Assure	.625 pt	0.8 EC	47
		.375 pt		43
LSD(.05)				16

¹Applied with 1 pt/100 gal X-77 surfactant

²Applied in split application, 1/2 in fall, 1/2 in spring

³Applied in normal volume of water (20 gal/acre)

⁴Applied with 1% crop oil in final spray



Effect of SO_2 and NH_3 on Fescue Seed Germination
and Endophyte Infestation Level

J. L. Moyer and S. R. Eckhoff¹

Summary

Endophyte-infested tall fescue seed was treated with different levels of SO_2 (an acid-forming gas) or NH_3 (a base-forming gas). Seed germination was reduced by concentrations of 0.2% SO_2 , but 2% NH_3 for 2.5 hr had little effect on 2-week germination percentage. Viable seedlings had similar percentages of endophyte in fumigated and untreated seedlots.

Introduction

The present method of obtaining endophyte-free fescue pasture is to destroy infested plants and establish anew from endophyte-free seed. Since most fescue fields are infested to a relatively high degree, endophyte-free seed is still somewhat scarce. Treatment of infested seed to eliminate viable endophyte would significantly increase endophyte-free seed supplies.

Experimental Procedure

Infested seed (initially 67%) was treated with either SO_2 or NH_3 . One hundred g or 50 g of seed was treated in a gas-tight 2.7 mil plastic bag, and various amounts of gas were introduced into the bag with needle and syringe. The seed was agitated to mix contents of the bag, incubated for a specified time at room temperature (~20 C), then removed from the bag and aerated.

The initial test with SO_2 was run on concentrations of from 0.01% (w/w, 3.3 ml/100 g seed) to 0.20% for times of 15 min to 25 hr. The second run used concentrations from 0.05% to 0.4% for 2.5 hr, replicated twice. Ammonia was used in concentrations of 0.1%-0.4% initially, then 0/2%-2% on the second run.

Germination was assayed by placing 50 seeds of each treatment on saturated blotter paper in a petri dish, replicated three times, in a 20 C germinator for 2 weeks, with periodic counting. Endophyte infestation was evaluated by growing seedlings in clay chips for at least 8 weeks, then examining lower leaf sheaths cytologically.

Results

Tall fescue seed germination was sensitive to SO_2 concentrations above 0.2% (Tables 66 and 67). Fescue endophyte was not affected in viable seedlings by SO_2 concentrations up to 0.2%, either regarding percentage infestation or amount of development in infested tissue (Table 66). Concentrations above 0.2% also had little effect on endophyte level in viable fescue seedlings after 8 weeks' growth.

¹Department of Agricultural Engineering, Kansas State University

Ammonia fumigation had less effect on fescue seed viability and endophyte level than did SO₂ (Table 68). Five-day germination was reduced by 2.5-hr, 1% NH₃ treatment, but total 2-week germination was not affected by up to 2% NH₃. Endophyte level in seedlings appeared reduced in the first run at 0.4%, but delayed development was probably responsible, since all treatments in run 2 eventually exhibited 50-60% infestation levels (data not shown).

Table 66. Effect of SO₂ Seed Treatment Rate and Time on Fescue Seed Germination and Endophyte Infestation Level and Intensity.

SO ₂ Treatment		Fescue Seed Germination %	Endophyte ¹ Infestation	
Rate %	Time hr		Rate	Intensity ²
0 (Control)	- -	83	90	3.1
.01	2.5	85	90	3.0
.05		85	90	3.0
.01	25	85	90	3.3
.05		91	90	3.3
.10	2.5	95	70	2.4
.20		83	90	3.5
LSD(.05)		8		

¹Evaluations based on two replications, 5 seedlings per rep.

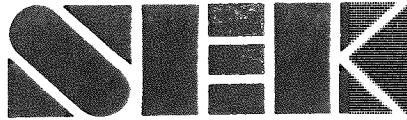
²Rated on scale of 0-4, where 0 is no endophyte and 4 is a large number of well-developed fungal mycelia in the lower leaf sheath.

Table 67. Effect of 2.5-hr SO₂ Seed Treatment Rate on Tall Fescue Seed Germination.

SO ₂ Rate	Fescue Seed Germination		
	6 Day	6-14 Day	Total
0 (Control)	80	8	88
.05	77	10	87
.10	78	10	88
.20	70	19	89
.30	58	24	82
.40	15	18	33
LSD(.05)	11	9	8

Table 68. Effect of NH₃ Seed Treatment Rate on Fescue Seed Germination and Endophyte Infestation Level.

NH ₃ Rate	Run 1		Run 2	
	Seed Germination	Endophyte Level	Seed Germination 5-Day	Seed Germination 14-Day
0 (Control)	95	67	73	84
0.1	94	83		
0.2	91	67	74	86
0.4	88	33	64	83
1.0			60	86
2.0			45	92



Other Forage Research

Joe L. Moyer

Summary

Other fescue fungus-related research is being conducted. Four fescue pastures at the Mound Valley unit were sampled periodically beginning in fall, 1983. No difference has occurred between one pair that was treated with mefluidide in 1984 and 1985 and a pair of control pastures. However, some time-of-year variation has occurred in the pastures. The situation will continue to be monitored.

Plots established from treated and untreated high-endophyte seed were sampled to determine infestation level, and fungus was apparently killed in about half the infested seedlings. Treatments will be imposed to determine relative agronomic and palatability differences in low vs. high infestation levels.

Production year and age as they affect live endophyte level in seed have appeared to vary, and experiments are being designed to study such effects.

Several other types of forage research are worthy of mention. Silage-type sorghums were tested in cooperation with the KSU Agronomy Department. Results are reported in Report of Progress 490, 1985 Kansas Sorghum Performance Tests. Stands at SEK and other locations were spotty, and seeding was rather late, but silage yields ranged from 9-22 tons/acre (70% moisture). Lodging was not a particular problem in 1985.

Five cultivars of big bluestem were established at the Mound Valley Unit in cooperation with the SCS PMC, Manhattan. Establishment notes and seedling data were collected in 1985, and forage yield and quality data will be collected in 1986.

Yields, crude protein, and P content of forage from Old World bluestems and other warm-season grasses were determined. End-of-season plot yields were highest from 'W.W. Spar' Old World bluestem (2.3 tons/acre), lowest for sideoats grama (1.4 tons/acre), and intermediate for 'OWB 535' and 'Kaw' big bluestem. Quality was low at that time, with crude protein ranging from 4.3-4.8%, and P contents from .14 to .19%. Forage quality at the same time in burned, clipped strips of Old World bluestems and 'Kanlow' switchgrass was better, with crude protein ranging from 5.3% for Caucasian bluestem to 6.7% for switchgrass, but yields ranged from only 1.3 tons/acre for Caucasian to 1.7 for OWB 535. Best forage quality was from second-cut eastern gamagrass, with crude protein and P contents of 8.9 and .27%, respectively, at a yield level of 1.1 tons/acre.

The bermudagrass cultivar trial established in 1980 was concluded in 1985 with stand survival notes. Three seeded types (from 'Guymon' crosses) and three sprigged types had satisfactory stands. The best stands of the sprigged types were plots of a local strain from Elk county ('Elk' or 'Harris'), 'Tift 44', and the experimental hybrid, 74 x 12-5. Stands of 'Midland' and 'Hardie' covered only about 10% of the plot area. Depletion probably resulted from winterkill after the late (October 8) 1984 cutting and wet soil in the plot area.



Fluid N-P-K Placement for Grain Sorghum in Selected Reduced Tillage Systems

D.W. Sweeney

Summary

Tillage systems (reduced, ridge, and no-till) had no significant effect on grain sorghum yields at two locations. However, at a low soil fertility site, highest yield was obtained when a N-P-K suspension was knifed with 50% of the N applied preplant and the remaining applied as a sidedress, as compared to other fertilizer application methods. At a high soil fertility site, yields were increased by the addition of fertilizer, but the method of application did not affect yields.

Introduction

Both economic and soil conservation concerns have influenced the interest in reduced tillage systems. The advancement of reduced tillage methodology has made it necessary to define soil fertility options. Several methods exist for the application of fluid fertilizers. Broadcasting, surface (dribble), and subsurface (knifing) banding of fluid fertilizers are some of the application alternatives. Split applications of applied N may also affect the yield of grain sorghum. The objectives of this study were to determine the effect of fluid fertilizer placement and split applications of N on grain sorghum yield in ridge-plant, no-till, and reduced tillage systems.

Experimental Procedure

Tillage methods comprise the main or whole plot treatments and fluid N-P-K application methods are the subplot treatments of a split-plot experimental arrangement. Table 69 describes the treatment variables. The experiment was conducted at two different sites on a Parsons silt loam at the Parsons field of the Southeast Kansas Branch Experiment Station. At Location 1, native meadow was first cultivated in fall 1983. Initially, available soil P was 6 lb P/a and available soil K was 100 lb K/a in the surface 6 inches. The total fertilizer rate for all plots at Location 1 was 150-100-150 (N-P₂O₅-K₂O), whereas plots receiving split N applications received 75 lb N/a preplant and 75 lb N/a dribble sidedress. Location 2 had been under cultivation for more than 10 years, thus available soil P was 44 lb/a and available soil K was 210 lb/a in the surface 6-inch zone. The total fertilizer rate for all plots at Location 2 was 150-50-100, with the split N applications applied as 75 lb N/a preplant and 75 lb N/a dribble sidedress.

Results

Tillage systems did not result in significantly different grain sorghum yields at either location (Table 70). However, the application of fertilizer did result in significant increases in yield as compared to areas receiving no fertilizer. At the low fertility site, Location 1, N-P-K fertilization resulted in approximately a 20 to 35 bu/a increase in yield above the checks. All fertilizer options resulted in yields that were not significantly different except for the increase in yield when the preplant nutrients were knifed and N was split applied. At the high fertility site, Location 2, the response to fertilizer as compared to the checks was not as great as at Location 1. The application of fertilizer regardless of method resulted in 10 to 15 bu/a higher grain sorghum yield; however, no differences in yield because of application method were found. These first-year data suggest that in low soil fertility areas, subsurface placement of fluid fertilizer suspensions, especially when N is split-applied, may result in higher grain sorghum yields. However, when soil fertility is in the medium to high range, additional fertilizer may increase yields but application method becomes less crucial.

Table 69. Description of Tillage and N-P-K Application Variables.

<u>Tillage</u>	<u>Application Method</u>
Reduced - disc, field cultivate	Check Check with applicator knives passed through soil
Ridge-plant	Broadcast - 100% N, P, K preplant
No-tillage	Dribble 100% N, P, K preplant
	Knife 100% N, P, K preplant
	Broadcast - 100% P,K 50% N preplant
	50% N dribble sidedress
	Dribble 100% P,K 50% N preplant
	50% N dribble sidedress
	Knife 100% P,K 50% N preplant
	50% N dribble sidedress

Table 70. Effect of Tillage and Fluid N-P-K Application Methods on Grain Sorghum Yields at Two Locations.

<u>Treatment Means</u>	<u>Yield @ 12.5% Moisture, bu/A</u>	
	<u>Location 1</u>	<u>Location 2</u>
<u>Tillage</u>		
Reduced	72.7	96.9
Ridge	75.1	93.1
No-tillage	72.1	90.8
LSD (0.05)	NS	NS
<u>N-P-K Application Method</u>		
Check	55.2	84.0
Check-Knife	53.2	85.9
Broadcast	78.0	96.1
Dribble	75.7	95.8
Knife	80.6	94.7
Broadcast - Split N	74.6	98.0
Dribble - Split N	79.8	97.7
Knife - Split N	89.2	96.8
LSD (0.05)	6.6	5.9
<u>Tillage by Method Interaction</u>		
F Value	NS	NS

Effect of Previous Wheat Residue Management and N Rate on Yields
in a Wheat - Doublecrop Soybean Rotation

D.W. Sweeney

Summary

Only in 1985 did wheat straw residue management affect doublecrop soybean yields. However, in both years measured, the previous residue management for doublecrop soybeans affected the subsequent wheat yields. Where soybeans were grown no-till, yields were 11 to 20 bu/a lower than where the previous wheat straw had been burned and then disced.

Introduction

Doublecropping soybeans after wheat is practiced by many producers in southeastern Kansas. Several options exist for dealing with straw residue from the previous wheat crop before planting doublecrop soybeans. The method of managing the wheat residue may affect not only the soybeans but also the subsequent wheat crop. Since wheat residue that is not removed may result in immobilization of N applied for the following wheat crop, an additional objective of this study was to observe whether an increase in N rate, especially where doublecrop soybeans were grown with no-tillage, could increase yields.

Experimental Procedure

Three wheat residue management systems for doublecrop soybeans with three replications were established in spring 1983. The three residue management systems were no-tillage, disc only, and burn then disc. After the 1983 soybean harvest, the entire area was disced, field cultivated, and planted to wheat. Before field cultivation, 300 lb/a of 6-24-24 was broadcast in all areas. In spring 1984, 67 lb N/a as urea was broadcast as a topdress to all plots. Wheat yield was collected from areas where the previous doublecrop residue management systems were imposed. Similar procedures were followed for the 1984-85 soybean and wheat crops with one exception. In spring 1985, residue management plots were split so that two topdress N rates were applied to the wheat. Topdress N rates of 57 and 103 lb N/a gave total N applications for wheat of 83 and 129 lb N/a, respectively.

Results

Wheat residue management had no significant effect on the yield of soybeans in 1983 (data not shown). Drought conditions resulted in an overall mean yield of 5.4 bu/a. Soybeans planted doublecrop in 1984 were also severely affected by drought conditions. Soybean plants were too small to allow for harvest, therefore, no harvest data were obtained. Even though

rainfall conditions were more favorable in 1985, no rain for approximately 3 weeks after planting resulted in poor weed control in no-till plots and, thus, no yield. Soybeans planted after discing the wheat residue yielded 21.1 bu/a in 1985, whereas soybeans planted after burning and then discing yielded 14.4 bu/a. The topdress N rate for the previous wheat crop did not affect the doublecrop soybean yields.

Management of wheat residue in 1983 significantly influenced the 1984 wheat yields (Table 71). Where soybeans were planted no-till in 1983, the 1984 wheat crop yielded 16 and 20 bu/a less than where the residue had been disced or burned then disced, respectively. (No significant occurrence of disease, including tan spot, was evident in the plots.) The percent protein in the grain was also lower ($P < 0.10$) where no-tillage had been used for doublecrop soybeans than with the other systems. This suggested a possible N immobilization when the previous years' wheat straw was tilled into the soil after no-till doublecrop soybeans and immediately prior to wheat planting.

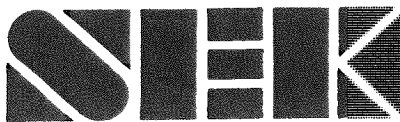
Because of the above results, two N rates were applied to the wheat grown in 1984-85. For whole wheat plant samples taken on May 2, 1985, the dry weight was higher ($P < 0.10$) where the previous wheat stubble had been burned and disced than for disc only or no-tillage (Table 71). N rate had no significant effect on dry weight. The percent N in the plant samples was not affected by previous residue management but was higher with the higher N application rate ($P < 0.05$). Nitrogen uptake on May 2 followed these two trends, indicating higher N uptake with burning of the previous wheat straw as well as with the higher N rate ($P < 0.10$). No interaction was observed between residue management and N rate. However, wheat yields in 1985 were affected by residue management but were not affected by N rate. Where doublecrop soybeans were grown no-till in 1984, the following wheat yields in 1985 were 7 and 11 bu/a less than where the previous residue was disced only or burned then disced. (All plots had high occurrence of disease, especially septoria leaf blotch, but no difference because of treatment could be determined.) No significant interaction between residue management and N rate was found. In contrast to 1984, the percent N in the wheat grain was unaffected by treatments. These data suggest that if immobilization is a problem, other factors may limit the effectiveness of additional N.

Table 71. Yield and Selected Growth Characteristics of Wheat as Influenced by Previous Residue Management and N Application Rates.

Treatment	Yield @12% Mois.		Protein in Grain		May 2, 1985		
	1984 --bu/A--	1985	1984	1985	Dry Wt lb/a	N %	N Uptake lb/A
<u>Previous Residue Mgmt.</u>							
Burn, then disc	63	59	15	15	3000	2.8	84
Disc only	59	55	15	15	2300	3.0	69
No-tillage	43	48	13	14	2200	3.0	65
LSD (0.05)	13	8	NS	NS	NS	NS	NS
LSD (0.10)	-	-	1	NS	500	NS	14
<u>N Rate (lb/a)</u>							
83	-	53	-	14	2400	2.9	68
129	-	55	-	15	2600	3.0	78
F Value		NS		NS	NS	*	.1†

* P<0.05

† P<0.10



Tillage and Nitrogen Fertilization Effects on Yields in a
Grain Sorghum - Soybean Rotation

D.W. Sweeney

Summary

In dry growing years, 1983 and 1984, grain sorghum or soybean yields were not affected by tillage systems. However, even though rainfall was more favorable in 1985, no rain for 3 weeks after planting resulted in poor weed control in no-tillage plots, thus lowering grain sorghum yields as compared to conventional and reduced tillage. Nitrogen fertilization method did not affect 1983 grain sorghum yields, but did produce a slight residual effect on soybean yields in 1984. Grain sorghum yields in 1985 were more affected by N fertilization methods with no-tillage than with conventional or reduced tillage.

Introduction

A wide number of rotational systems are employed in southeastern Kansas. This experiment was designed to determine the effect of selected tillage and nitrogen fertilization options on the yield of grain sorghum and soybeans in rotation.

Experimental Procedure

A split-plot design with four replications was initiated in 1983 with tillage systems as whole plots and N treatments as subplots. The three tillage systems were conventional, reduced, and no-tillage. The conventional system consisted of chiseling, discing, and field cultivation. The reduced tillage system consisted of discing and field cultivation. Roundup was applied each year at 1.5 qt/a to the no-till areas. The four nitrogen treatments applied at 125 lb N/a to the 1983 and 1985 grain sorghum were a) zero N applied, b) anhydrous ammonia knifed to a depth of 6 inches, c) broadcast urea-ammonium nitrate (UAN - 28%N) solution, and d) broadcast solid urea. Soybean harvest was taken from each subplot in 1984 even though N fertilization was applied only to grain sorghum grown in 1983 and 1985.

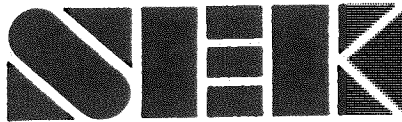
Results

No significant differences because of tillage or N fertilization were found for grain sorghum yield in 1983 (Table 72). Dry growing conditions resulted in an overall mean yield of 45.2 bu/a. Soybean yields in 1984 were not affected by tillage but were affected by the 1983 N application. However, since drought conditions existed in 1984 as well as in 1983, these yield differences were small. Tillage and N fertilization options significantly affected grain sorghum yields in 1985. A significant interaction between

tillage and N fertilization was observed for grain sorghum yield. For both conventional and reduced tillage, the addition of N, regardless of source, resulted in an approximately 20 bu/a increase in yield. However, with no-tillage, the application of anhydrous ammonia resulted in a 40 bu/a higher yield than in the check and a 10 to 20 bu/a higher yield than from the application of solid urea or UAN solution. Even though from different N sources, the 1985 data suggest that deep placement of N fertilizer may produce higher grain sorghum yields in no-tillage systems. The lower mean yields obtained with no-tillage as compared to reduced or conventional tillage systems in 1985 may be due in part to increased weed competition. The lack of precipitation for 3 weeks after application reduced the effectiveness of the pre-emerge herbicides.

Table 72. Effect of Tillage and N Fertilization on Yields in a Grain Sorghum - Soybean Rotation.

Treatments		Yield, bu/A		
		Grain Sorghum	Soybean	Grain Sorghum
		1983	1984	1985
<u>Tillage</u>	<u>N Fertilization</u>			
Conventional	Check	45.1	5.6	81.3
	Anhydrous NH ₃ - knifed	47.5	6.1	99.5
	UAN solution - broadcast	47.9	5.4	98.3
	Urea solid - broadcast	46.8	6.5	102.6
Reduced	Check	46.2	5.3	80.0
	Anhydrous NH ₃ - knifed	48.0	5.0	101.2
	UAN solution - broadcast	43.2	6.2	100.6
	Urea solid - broadcast	46.7	7.7	98.6
No-tillage	Check	44.0	5.4	35.7
	Anhydrous NH ₃ - knifed	40.9	6.7	76.3
	UAN solution - broadcast	40.5	4.2	57.8
	Urea solid - broadcast	45.7	5.9	65.5
	LSD (0.05) (any comparison)	NS	NS	11.0
	LSD (0.05) (same tillage)	NS	NS	9.5
<u>Means, Tillage</u>				
Conventional		46.8	5.9	95.4
Reduced		45.9	6.0	95.0
No-tillage		42.8	5.5	58.8
	LSD (0.05)	NS	NS	7.3
<u>Means, N Fertilization</u>				
Check		45.0	5.4	65.6
Anhydrous NH ₃ - knifed		45.2	5.9	92.3
UAN solution - broadcast		43.9	5.3	85.6
Urea solid - broadcast		46.4	6.7	88.9
	LSD (0.05)	NS	1.0	5.5



Effect of Ridge-Planting, Reduced Tillage, and No-Tillage on Wheat Yields

D.W. Sweeney and J.B. Sisson¹

Summary

At the Parsons field and the Columbus field in 1983-84 and 1984-85, respectively, higher wheat yields were obtained by planting paired rows 10 inches apart on ridges on 30-inch centers as compared to planting uniformly in 10-inch rows in reduced- or no-tillage systems. Broadcast or dribble applications of N solution as a spring topdress did not affect yields.

Introduction

Ridge- (or till-) planting is gaining interest in several areas of the state and country. Crops grown in soils that have subsoil with a high clay content under a shallow topsoil, as in southeastern Kansas, may benefit from ridge-planting, not only due to better drainage and/or warmer spring soil temperatures (as compared to no-till) but also from a deeper topsoil rooting depth. This study was initiated to determine wheat yield response to ridge-planting, reduced tillage, and no-tillage systems.

Experimental Procedure

The study was conducted at the Parsons field in 1983-84 and at the Columbus field in 1984-85. Wheat variety, 'TAM 105', was planted at 1.5 bu/a in four minimum tillage systems. Wheat was uniformly planted on 10-inch centers in three systems, ridge (made with a Buffalo cultivator on 30-inch centers), reduced-tillage, and no-tillage. The ridge system described above will hereafter be referred to as ridge 10-10. A fourth system (hereafter referred to as ridge 10-20) was included where wheat was planted at 1.5 bu/a in paired rows 10 inches apart on ridges on 30-inch centers, leaving a 20-inch unplanted area between ridges. The reduced tillage system consisted of field cultivation after harvest of a soybean crop. All plot areas received broadcast applications of 300 lb/a of 6-24-24 in the fall and 67 lb N/a in the spring. In 1984 at the Parsons field, the spring topdress N was urea broadcast over the entire area. In 1985 at the Columbus field, the spring topdress N was UAN (urea-ammonium nitrate solution 28% N) applied as broadcast or dribble applications.

¹Soil Physicist, Department of Agronomy, KSU

Results

Wheat planted in paired rows on ridges (ridge 10-20) at Parsons in 1983-84 yielded approximately 10 bu/a more than wheat grown in reduced- or no-tillage systems (Table 73). Intermediate yields were achieved by planting wheat uniformly 10 inches apart on ridges on 30-inch centers. Even though yields obtained in 1984-85 at the Columbus field were lower than those obtained the previous year at Parsons, trends among treatments were similar (Table 73). Highest yield was obtained with the ridge 10-20 system. This system resulted in 7 to 12 bu/a higher yield than reduced- or no-tillage treatments, respectively. Ridge 10-10 resulted in higher yield than no-tillage but was not significantly different than yield obtained with reduced tillage. Spring N topdress application method did not significantly affect yields.

Table 73. Wheat Yield as Affected by Reduced Tillage Systems and Method of Spring Topdress N Application.

<u>Treatment Means</u>	<u>Yield @ 12.5 % Moisture</u>	
	<u>Location (Harvest Year)</u>	
	<u>Parsons (1984)</u>	<u>Columbus (1985)</u>
	<u>bu/a</u>	
<u>Tillage</u>		
Ridge 10-20	59.7	30.8
Ridge 10-10	54.0	24.4
Reduced	50.0	23.6
No-tillage	49.5	18.9
LSD (0.05)	7.3	5.2
<u>N Application Method</u>		
Broadcast	-	24.5
Dribble	-	24.3
F Value	-	NS



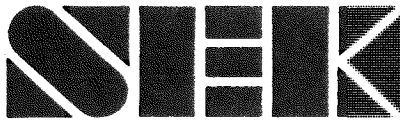
Other Soil and Water Management Research

D.W. Sweeney

The following topics were also researched in 1985, and are worthy of mention.

Effect of Liquid P-K Placement and Rates on Grain Sorghum and Soybeans in Rotation in Reduced Tillage Systems. Three rates of liquid P-K fertilizer were either dribble or knife-applied to grain sorghum and soybeans in reduced-, ridged-, and no-tillage systems. Even though rainfall was generally adequate, a short dry period after planting resulted in very poor weed control in no-tillage plots and, thus, no yields. No significant differences were found for the remaining treatment variables for either grain sorghum or soybean yields. Overall grain sorghum yields were 97.1 bu/a, whereas soybeans yielded 29.4 bu/a.

Effect of Irrigation Timing and N Application Method on Grain Sorghum Because of adequate rainfall in 1985, no irrigations were necessary. However, the addition of 100 lb N/a of UAN (urea-ammonium nitrate solution, 28% N) fertilizer applied preplant resulted in a grain sorghum yield of 100 bu/a, whereas no nitrogen addition (check) resulted in 78 bu/a yields. Split N application of 50 lb N/a preplant and 50 lb N/a at either the 9-leaf, boot, or soft dough stage resulted in lower yields than applying 100 lb N/a preplant, however, the small reductions were not statistically significant. For the previous year's data see Report of Progress 472.



The Weather for Southeast Kansas in 1984 and 1985

L. Dean Bark¹

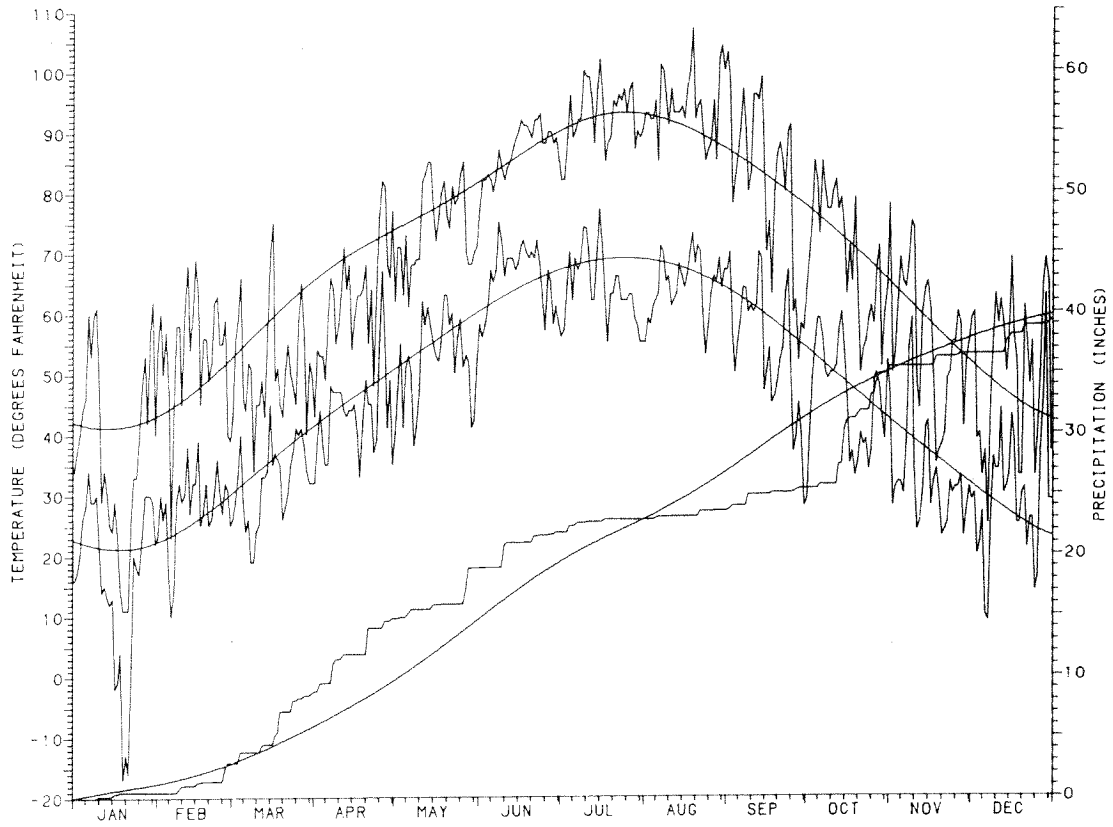
The charts that follow show graphically the daily weather in Parsons during the last 2 years. Each chart has 3 smooth curves to represent the average weather conditions at Parsons based on 70 years of record from the Experiment Station files. The two smooth curves near the top of the charts show the average maximum and minimum temperatures that occur throughout the year. They reach a low point in mid-January and climb to a peak in mid-July. The smooth curve in the lower part of the chart indicates the average accumulative precipitation during the year. Starting at zero on January 1, it gradually increases throughout the year until it reaches the average annual total precipitation on December 31. This curve climbs quite steeply during mid-year when considerable rain occurs in Kansas, and less steeply at the beginning and end of the year when only small amounts of snow or rain are received.

The actual temperature and accumulated precipitation totals that occurred throughout 1984 and 1985 are also plotted on these charts so that the "weather" can be compared with the climatic averages. Note that on the actual precipitation curve, a vertical section indicates rain on that day, and a horizontal section means that no rain occurred during the period.

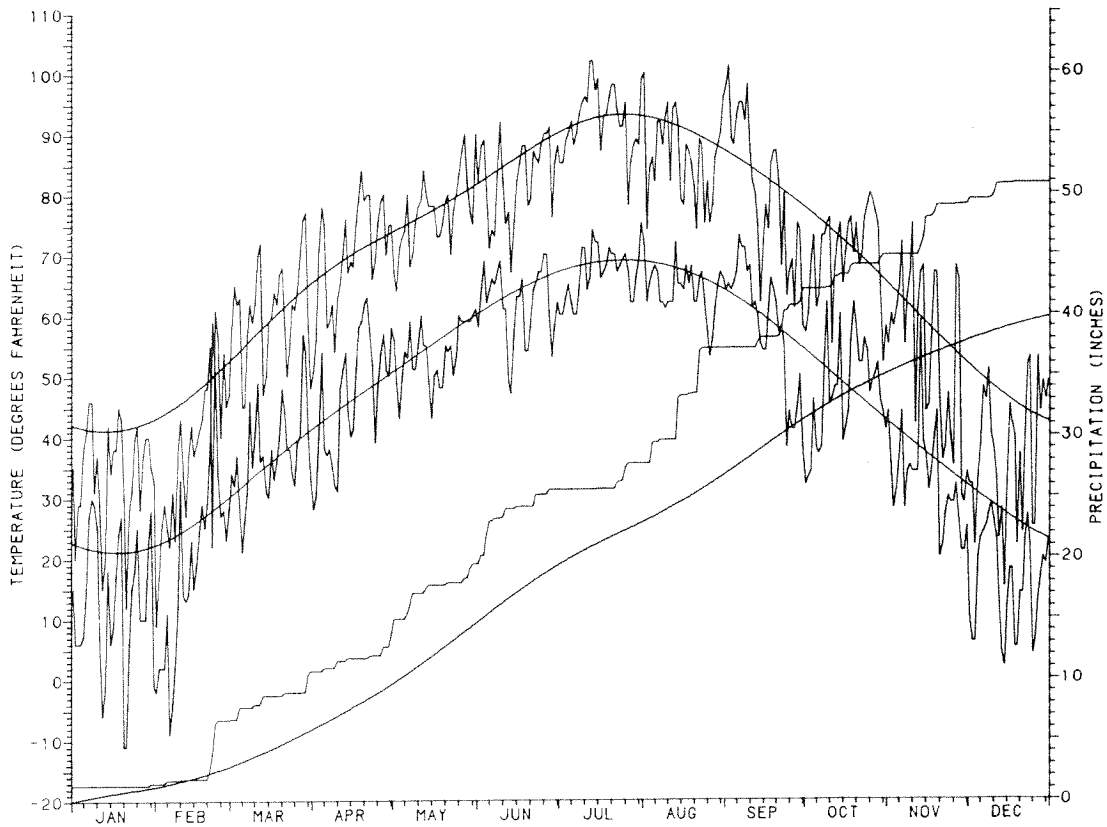
The 1985 temperature chart shows a very cold beginning to the year, and a similar finish, when December mean temperatures were 11 degrees below normal. March was the only month with a mean temperature above normal. As a result, the annual mean temperature for 1985 was the lowest for any year since 1900. The cool temperatures during the crop-growing season kept water stress to reasonable levels. However; these low temperatures slowed plant growth and maturation, reducing grass and forage production in mid-summer. Yields for some late planted, or slow-maturing crops were reduced by the earlier than average freeze occurring on October 1st. In 1984, the first freeze in the fall was almost on the same date--September 30th.

Precipitation for 1985 was over 10 inches above the total received in 1984 when the amount was about average. The major difference between the two years was in the distribution of precipitation. Summer rains were more evenly distributed in 1985 than 1984, when there was a period of around 100 days from June to September with little rainfall. Frequent rains and cloudy skies in 1985 often made timely field operations difficult. Substantial rains late in September and October should have recharged soil moisture used during the 1985 growing season.

¹Climatologist for the Agricultural Experiment Station, Department of Physics



GRAPHICAL WEATHER SUMMARY FOR PARSONS 1984



GRAPHICAL WEATHER SUMMARY FOR PARSONS 1985

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E. Kanemasu, Evapotranspiration Lab, KSU
Kansas Soybean Comm.
G. Kilgore, Area Agronomist, Chanute
D. Kissel, Dept. of Agronomy, KSU
F. Lamm, Colby Branch Expt. Sta., KSU
Markley Seed Farms
N. Meyer, Weir, KS
Mobay Chemical Corp.
Monsanto Agricultural Products
J. Murnane, Girard, KS
L. Murphy, Manhattan, KS

New Breeds Industries, Inc.
J. Nicholson, SCS Plant Materials Center, Manhattan
PAG Seeds
PPG Industries
Parsons Chamber of Commerce
G. Paulsen, Dept. of Agronomy, KSU
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Pioneer Hi-Bred International
Pioneer Seed Co.
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Sharp Bros. Seed Co.
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J. Smith, Mg. Co. Ext., Independence, KS
D. Springer, Independence, KS
Stauffer Seed
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U.S.S. AgriChemicals
Uniroyal Chemical Co.
V. Vaverka, Dennis, KS
T. Walters, Dept. of Agronomy, KSU
D. Weaver, Dept. of Agronomy, Auburn Univ.
D. Whitney, Dept. of Agronomy, KSU

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